Overseas Investment in the Electronics Industry and its Implications for the Irish Economy

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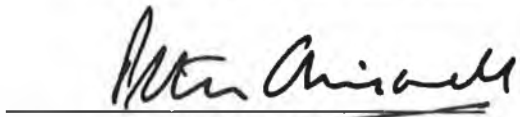
DECLARATION

I declare that this thesis "Overseas investment in the electronics industry and its implications for the Irish economy" is based solely on my own work, except where duly noted and acknowledged, and I declare that it has not been previously submitted for the award of diploma or degree at any other academic institution.

This research was carried out under the supervision of Professor Peter Chisnall, Head of Management Division, Dublin Business School, Dublin City University over the period October 1990 to September 1992.

Signature of Research Student



Signature of Supervisor

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ABSTRACT

The economic development of a host country may benefit from overseas investment in a number of ways. Directly, the gains may occur through the provision of employment or indirectly through spill-over effects. Using both the theory of foreign investment, in particular Dunning's eclectic paradigm, and the theory of multinational behaviour the expectations of the operating characteristics of investing firms may be determined.

Following the determination of the motivation for overseas investment this study applies these theories to the Irish electronics industry and examines both the direct and indirect contribution of these firms to the Irish economy. It discusses various aspects of the trends of employment and examines the growth potential of the industry in the context of the Single European Market and other stimuli which may affect future overseas investment. The contribution of the electronics industry to Irish export earnings is also discussed, as are the implications of the manipulation of transfer prices which effectively switch profits to Ireland.

A survey of all electronics firms operating in Ireland was also conducted and the results analysed and compared with the expectations of both multinational and indigenous firm behaviour. The survey was also used as a basis for an examination of firms formed through either entrepreneurial spin-offs or the management buy-out of a multinational firm which had previously invested in Ireland. An overview of the electronics industry complete with conclusions and recommendations for policy changes are outlined in the final section.

CHAPTER ONE

RESEARCH STUDY OUTLINE

1.1 Introduction

This chapter provides a brief outline of the research study. It is divided into five sections. The following section discusses the problem of defining the industry and introduces the definition which is used throughout the thesis. The various subsectors of the electronics industry are also identified.

Section 1.3 gives a brief synopsis of the history of the electronics industry. It traces the development of the industry from its origin in the 1800's to the present. A description is also given of the various advancements in the industry which have resulted in it being among the most dominant growth sectors.

Section 1.4 provides a summary of the global electronics industry. It explains why the industry has grown so rapidly over the previous decades and details who the principal market leaders are. A discussion is also undertaken on why both the US and Japan are the dominant producers of electronics components and the various initiatives adopted by the EC to reverse this trend. Changing patterns of production are also discussed.

The final section discusses the research problem. It details the various literature reviews which were completed and explains the objectives of the thesis. A summary of the methodology of each of the chapters is also given.

1.2 Definition of the Electronics Industry

Various organisations interpret what constitutes that electronics industry in a variety of ways. Some see it as the amalgamation of Electrical Engineering industry with the manufacture of computer products. For the purpose of this study it is considered that this definition is too broad since Electrical Engineering consists of, amongst others, the manufacture of electric blankets, wires, cables and so on. It would be unacceptable to include all subsectors of this industry since this would effectively mean that anything which carries an electrical current could be considered an electronic device.

Cable et al. provide a useful, more rigorous definition of the electronics industry and subsequently is used throughout the thesis. They describe the industry as consisting "...of those products or systems that use electronics circuits handling small currents which incorporate active components capable of modifying the flow of electricity".[1]

This definition effectively corresponds to three subsectors; the manufacture of passive and active components and the manufacture of computer products. Resistors and switches are examples of passive components. They are used to control the flow of current in electronic systems. Examples of active components are semiconductors and integrated circuits. These components are at the central core of all electronic devices.

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[1] Cable & Clarke, 1981, p4

1.3 History of the Electronics Industry

Pioneering work in the electronics industry can be traced back to the 1800's. By passing an electrical current through wires which were contained in partial vacuums physicists noticed that the wires glowed. Around 1870 a British scientist, Sir William Crookes, discovered that it was particles, later known as electrons, that caused this glow; which is often termed thermionic emission.

It was found that these electrons had a negative charge and would flow towards a metal plate if it were positively charged. This simple procedure enabled the development of various mechanisms to control the flow of current, subsequently initiating the electronics age.

In 1937 Alan Turing, often regarded as the first computer scientist, derived a complex mathematical function which proved that by using addition, subtraction and comparison a system could be developed which could handle many algebraic and mathematical operations.

It was apparent that by controlling the flow of current one could develop logic functions, also known as binary operations, based on Turing's hypothesis to solve numerical operations. This worked through multiple combinations of the on/off states of electrical valves and enabled the design of the first computer.

Because of its size this first valve computer was known as Colossus and was designed in the UK by Turing, Flowers & Newman in 1943. Its primary task was to break German transmission codes produced by the cryptographic machine during the second world war. This task was duly completed and is cited as hastening the downfall of the Third Reich.

The success of Colossus prompted the development of a new valve computer, the ENIAC (Electronic Numerical Integrator and Calculator). This computer, like its predecessor, was developed for military applications and was used to calculate the complicated trajectories of missiles under the forces of velocity, gravity and air resistance. It was also used in the development of the hydrogen bomb.

Unlike the modern computer these machines could only have military and research applications. Their principal disadvantage was their size. ENIAC, for example, weighed over thirty tons and filled the floor space of an entire office block. It used over 18,000 valves and at any one time over fifty assistants were required to keep it in operation. Furthermore when it did work it did so for no more than a few minutes at a time.

So cumbersome were these machines that in 1948 a market research survey conducted on behalf of IBM concluded that their would never be sufficient demand to justify their entrance to this market. History, however, indicates otherwise. Although unknown at the time an invention in 1947 at Bell

laboratories was set to have enormous ramifications on the development of the electronics industry. It was Bardeen, Brittain and Schockley who, while working on a replacement for mechanical relays in telephone exchanges, discovered the transistor effect. They used a combination of elements in a sandwich type structure to modify electrical signals in a number of ways. It was in this way that the first semiconductor devices were manufactured.

These first devices had limited applications due to their high cost and poor stability and like the first computers were of scientific curiosity only. In 1959, however, the constituent materials of the transistor were modified as was the production process. This resulted in the increased miniaturisation of the device together with an improvement in its reliability. While still costly large military orders helped in the development of this new industry.

These devices had a variety of applications, initially being used in radios and hearing aids. Valves were increasingly replaced by transistors and in 1955 IBM marketed a computer almost entirely based on them. Like the transistor it was the integrated circuit, developed in the early 1960's, which was to have the next most crucial impact on the electronics industry.

This device allowed a number of transistors together with other components to be placed on a single silicon chip. The ever increasing number of components capable of being placed on this chip lead to the invention of the microprocessor, the central processing unit of everyday computers.

1.4 Summary of the Global Electronics Industry

Following the development of the microprocessor the electronics industry has persistently emerged as one of the most dominant growth sectors. The primary reason is the tremendous explosion in the applications of semiconductor devices. This in turn has caused an increase in the market for passive components, generally because they are incorporated into all types of electronics devices which use active components (microprocessors). Increased applications have invariably lead to cost reductions. For example it is estimated that the cost per electronic function fell by a factor of 100,000 over the period from the mid 1960's to the mid '80's.[2]

This decline in costs is attributed to two reasons : (a) the highly competitive nature of the industry and (b) the ever increasing ability to place more individual circuits on the one chip. These two factors are, in fact, interrelated. Competition within the industry is such that firms strive to make devices as small as possible, hence the ability to place more circuits on a single chip.

Theoretical physics suggests that the smaller the device is, the lower its heat dissipation and the faster it will operate. Since speed of electronic devices leads to competitive advantages considerable research effort is placed into making as many components as possible fit on to the one chip. Improved

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[2] Siegal, 1980, p3

manufacturing processes have resulted in chips with one device mounted on it in the 1950's being replaced by chips with up to one hundred circuits on it by the 1960's. Over the past three decades this has increased many times over. Since the 1980's hundreds of thousands of circuits are capable of being placed on a single chip.

Through molecular beam epitaxy (MBE) devices are now capable of being formed which are only one atom in width. Through this process it is expected that devices many times smaller than once thought possible will be manufactured. It has been estimated that by the mid 1990's it will be possible to place almost four million components on a single chip, subsequently rising to one billion by the end of the century.[3]

The difficulties in perceiving what the significance of placing more circuits on an individual chip may be overcome if one is to use an analogy given by Forester.[4] In the 1950's information about one street could be placed on a single chip; by the end of the next decade the same device could store a street map of a small town; by the 1970's a chip could contain the street map of a small city. By the mid '80's the Los Angeles area could be placed on a single chip. At present it is possible to put the entire street map of North America on the chip; by the turn of the next century, using systems like MBE, it should be possible to place the entire world on one. This

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[3] Forester, 1987, p2
[4] Forester, 1987, p21-23

miniaturisation of components has lead to them being incorporated into an increasingly larger number of products resulting in demand consistently rising, subsequently driving prices down and effectively creating a virtuous circle.

One of the dominant driving forces of electronics production is the continued expansion of the global information technology (IT) industry. The world market for information technology has risen by a factor of five to $230 billion over the period 1974-1983 and it is hypothesised that by the mid 1990's it will rise to over $1 trillion.[5] This market share is not, however, evenly spread globally. If one is to engage in even a brief literature survey it is immediately apparent that firm names from the US and Japan recur most often. While there are some large European firms they do not appear to have any significant market share.

Europe's relatively weak position may be seen by considering that in 1975 the EC had a trade surplus in IT products of 1.7 billion ECU; by 1984 this situation had substantially reversed with the result being a 5 billion ECU trade deficit. European manufacturers also supplied only 10 per cent of the world and 40 per cent of domestic information technology markets.

Another cause of concern is the reliance on non-EC firms for computer products. It has been estimated that IBM alone controls over 50 per cent of

[5] Macharzina, 1986, p244

the European computer market.[6] The inability of European producers to supply the home market, especially in IT, has been the subject of several EC initiatives. Discussions between the twelve major European electronics giants and the Commissioner for Industry resulted in a programme known as ESPRIT (European Strategic Programme for Research and Development in Information Technology) with an estimated initial budget of $1.3 billion being formed.

The central idea of the programme was the establishment of collaborative research and development (R & D) efforts by firms in EC countries with the common underlying objective of fighting external competition principally from the US and Japan. The success of this programme has been limited. While it has provided much needed state assistance for many projects it has not resulted in the EC gaining any significantly larger proportions of the world electronics market. The US and Japan still remain and for the foreseeable future are likely to remain the most dominant market leaders.

In all aspects of electronics production Europe appears to have considerably lower market shares than either the US or Japan. Figure 1.4.1, for example, provides a geographical breakdown in the current levels of output in the production of integrated circuits in Western Europe, the US and Japan.

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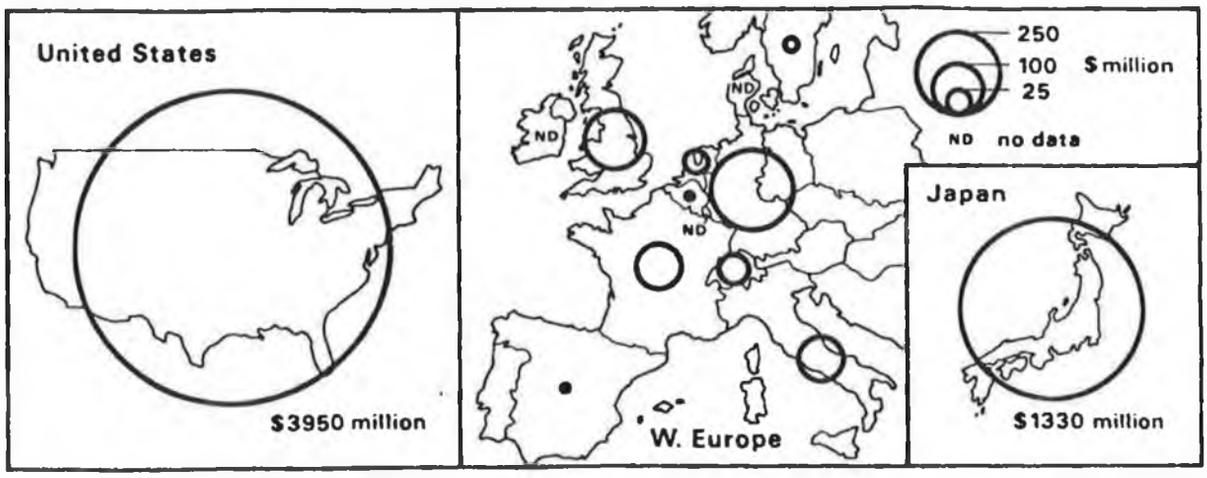
[6] Jowett & Rothwell, 1986, p47

Figure 1.4.1

Production of Integrated Circuits in Western Europe, the United States and Japan[7]



Though changing, a readily apparent feature of the above figure is the domination of the industry by the US. It produces $3.9 billion worth of circuits compared with $1.3 billion in Japan and varying amounts in Europe. Ninety nine percent of all world production originates from these three sources. Two thirds are manufactured in the US roughly 25% in Japan and under 10% in Europe.

One of the reasons for the domination of the US is related to its significant military expenditure. All of the new electronics devices produced over the past few decades have in some way been initiated through military projects. In the US government funding for research reached 454 million dollars in 1987 with a characteristic being that the majority of the funding was related specifically to defence, space and energy concerns. Government funding for

[7] Dicken, 1986, p319

microelectronics research for commercial use was virtually non existent.[8] It has been commented that so significant is military research that it was one of the contributing factors to why western European semiconductor production is significantly lower compared to the US.[9] In 1983, for example, the US share of the semiconductor market was 43% followed by Japan with 37% and finally Europe with 20%.[10]

Studies over the past two decades have indicated a growing change in the shares of markets, most notably with US firms losing at the expense of the Japanese. Dunning for example comments that while the US over the last twenty years has led the world in the export of semiconductor technology its trade balance in electronic and communication equipment (excluding computers) has continuously deteriorated with Japan picking up the lost markets.[11]

Three key aspects of industrial policy has enabled Japan to gain this increased share of the microelectronics market. Firstly, in general the government has adopted a non-interventionist policy towards the management of firms. Rather it seeks to create an economic environment which is conducive to the formation of firms. The second feature of Japanese policy is that once an industry has been identified with significant

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[8] Howell, 1988, p109-110
[9] Shepherd, 1983, p217
[10] Macharzina, 1986, p244
[11] Dunning, 1981, p323

growth prospects it is targeted for eventual domination through price cutting and heavy promotion. Thirdly, and perhaps most importantly, Japan places considerable emphasis on research and development.

Government initiatives such as the formation of the Key Technology Centre have been instrumental in enabling firms to gain control of a considerable proportion of the electronics market. The primary objective of this centre is to provide low interest loans to firms to help them develop marketable products through research projects. The system of loan repayments has the advantage that any company whose research efforts fail don't have to pay back any interest on loans.

The programme also provides risk capital for projects that may show low rates of return on investment over the shorter term but have future profit potential. In addition the promotion centre also acts as a go between for private companies and government laboratories in the hope of sharing up R & D co-operation between industries, academia and the government.[12]

These Japanese initiatives have been extremely successful in increasing their share of the world semiconductor market. Another factor to be considered is the Japanese working environment. The manufacture of semiconductor devices requires considerable attention to the removal of contaminant particles during the manufacturing process. If these particles are not

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[12] Howell, 1988, p112

removed they have the effect of reducing the reliability of devices. Japanese attention to quality control has enabled them to overcome this problem and produce products of exceptionally high reliability. They also have developed highly automated production lines with inbuilt automatic testing equipment which, again due to the reliability of the products, has resulted in them capturing previously held US markets.

The aggressive Japanese policy of price cutting has been blamed as one of the reasons for the recessionary early to mid 1980's period of the US electronics industry. By 1985 overproduction and competition caused sales for US firms to decline by a significant 31%.[13] This dramatic loss of markets subsequently caused US firms to continue to lose their shares of global markets in some subsectors of the electronics industry since they have not had the capacity to reinvest in research and development.

As a result of the increased competitive pressures within the industry these firms have been searching for new mechanisms to reduce costs. This has resulted in production continuously being switched to sometimes diverse and quite dissimilar geographical locations. US firms have been especially prolific in establishing subsidiaries in both third world countries and in the more semi-peripheral areas of Europe. Correspondingly the motivations for such investments are diverse. They range from different government policies, avoidance of tariffs to geographical variations in labour costs.

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[13] Forester, 1987, p61

1.5 The Research Problem

Industrialising nations who themselves do not have the capacity to generate new high technology industries pin much hope on inward investment by multinationals[14] to upgrade their technological base. It is through the location of key business functions such as research & development, marketing and so on that host governments perceive the greatest returns and as such actively encourage them. They not only see multinationals as providing direct returns, through employment and tax revenue, but possibly also indirect contributions via entrepreneurial start-ups or new firm formation from linkages.

Since the late 1950's Ireland has adopted economic policies which actively encourage overseas investment, particularly in the higher technology export orientated industries. At present this policy has resulted in overseas firms accounting for just less than half of total manufacturing employment, and the most significant proportion engaged in the higher technologies. This study involves an examination of the contribution of this investment in the electronics industry to the Irish economy.

An examination of the literature relating to the theories of foreign investment was conducted to determine which one would most adequately explain the path to overseas investment by electronics multinationals. The

[14] See Appendix 'A' for the various definitions of the multinational enterprise and a discussion of the distinction between foreign owned and multinational firms in Ireland.

eclectic paradigm, as described by Dunning, was considered the most applicable. This model in fact explains almost all forms of foreign investment in any sector, ranging from services to manufacturing. Through the paradigm the factors governing overseas investment by electronics firms was sought. When they were determined the model was applied to investment in the Irish electronics industry to establish the principal factors in the choice of Ireland as a location for foreign investment. This necessitated a review of industrial policy from the early 1950's to the present.

Once the primary motivation for the establishment of overseas operations in Ireland was determined a review of the theory of multinational behaviour was initiated so that the expectations of certain aspects of these operations could be established. This was initially used to examine the growth potential of the electronics industry in the face of expected competition though trade liberalisation as a result of the completion of the Single Market.

An examination was also made of the trends of US capital expenditure investment to determine if the entry of low labour cost locations such as Spain and Portugal to the EC would adversely affect Ireland's relative country specific advantages. The effects of various technological advances in the electronics industry were also examined to determine if they would have any negative effects on investment in Ireland.

Part of the study involved a discussion of the trends of employment within the electronics industry since Ireland's entry to the EC. No one data source existed to determine these trends in the three electronics subsectors. What data did exist related to various definitions of the industry which were perceived to be too broad for this study. Several different sources had to be identified and drawn upon to enable a discussion to be completed. The same sources were used to collate trade data to determine if expectations, such as the motivation for investment in Ireland, could be verified.

Given that multinationals have the corporate objective of profit maximisation it is expected that they will perform operations which are most closely identifiable with this aim. It is in this context that the possibility of multinationals using their internal market to artificially inflate profits and centre them in Ireland, to avail of the low rates of corporation tax, is discussed.

The problem of determining the existence of manipulation of these internal prices, commonly known as transfer prices, is that virtually no clear cut data, derived from for example case studies, for obvious reasons exists. It is possible, however, by examining various economic data and by making assumptions of certain aspects of multinational behaviour to infer its existence. A review of the literature available pertaining both to the existence and non-existence of manipulation of transfer prices was conducted and is followed by a discussion and implications of multinationals

electronics firms switching profits to Ireland.

A survey of electronics firms operating in Ireland was conducted and may, in fact, be regarded as a 'Census' of electronics firms since all electronics manufacturing operations in the country were surveyed. The primary objective of the survey was to gather hitherto uncollected data to determine if certain expectations of multinational behaviour were valid.

It also enabled a comparison of the operating characteristics of both indigenous and overseas firms so that the differences in the trends of operation could be examined. Information was sought on topics ranging from the motivation for investment in Ireland to perceptions for the future of the industry in Ireland. Since no comprehensive listing of electronics firms, as defined in section 1.2, was available a sample population was drawn from IDA, Kompass and CTT company listings. This is discussed more fully in the research methodology chapter.

The thesis concludes with a discussion of the research findings through an examination of the present state of the industry and perceptions for the future.

CHAPTER TWO

THEORY OF
FOREIGN DIRECT INVESTMENT

2.1 Introduction

Multinationals are perhaps the greatest exponents of international trade. This chapter details various aspects of this trade. It begins with describing what foreign investment is and presents a summary of the trends of overseas investment from the early 1900's to the present. Also discussed is the various motivations, both internal and external to the firm, which prompt the investment decision.

Many theories of foreign investment have been proposed to explain various aspects of transnational investment. A summary of many of the original models, together with their limitations and/or associated failings, is presented. Among those discussed are industrial organisation and location theory, international capital theory, Lessard's risk reduction via diversification and various aspects of the product life cycle (plc). Also discussed is the changes made to the plc in an attempt to explain the changing patterns of world wide investment in the late 1960's and early '70's.

The chapter concludes with a detailed discussion of Dunning's eclectic paradigm. This model has been described as one of the most general widely applicable theories of foreign investment. Various aspects of the paradigm are used it to explain overseas investment in the electronics industry.

2.2 Defining Foreign Direct Investment

Theories of foreign direct investment (fdi) detail why multinational enterprise's (MNE's) establish subsidiaries abroad rather than serve the market through any other means. Such theories also attempt to identify how, when established, these affiliates can outcompete local firms in the supply of either their home or export markets.

A large variety of motivations for the fdi decision have been identified. So too have a large number of theories defining fdi. The following section entertains a summation and examination of these theories in an attempt to understand the process of fdi.

Foreign direct investment has been described the ownership and management of a foreign operation.[15] This definition is based on the principle of the multinational having control of an operation. However, using the concept of control as a basis for defining fdi is a poor one as proportions of share equity owned by the parent firm provides little measure of this control. For example, government intervention can diminish the control which a MNE can hold over it's affiliate. A firm which owns 100% of the share equity of an affiliate may find it still does not have absolute control.

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[15] Hood, 1979, p9

Nevertheless some institutions do utilise this concept as a means of defining fdi. The US Dept. of Commerce defined fdi as an investment that controlled 25% or more of the equity of an overseas business. Subsequently this figure has been reduced to 10%.[16]

Dunning, whose model of multinational behaviour will be used to explain foreign investment, introduces another concept; that of the possession and transfer of intangible assets. Foreign investment, he comments, "...is the vehicle by which resources are transferred and allocated across national boundaries without any change in their ownership".[17]

Resources in this context are not restricted to money capital but also refer to knowledge and experience. These resources are internal to the firm and are generally described as intangible assets. In this way Dunning avoids the problem of trying to rigorously define fdi and negates the necessity to define 'control'. The usage of these 'assets' within the company alone, will be used to form a basis for explaining the ability of multinationals to engage in overseas investment.

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[16] Hertner & Jones, 1986, p4
[17] Dunning, 1988, p84

2.3 Trends of Overseas Investment

The phenomenal growth of the multinational firm began in the post World War II period. The extension of the multinational enterprise was "...facilitated by a technological revolution which has encompassed transportation, communications, data processing and management techniques".[18]

Empirical work by Dicken places this growth into context. Over the period 1946-1952 the "...average number of manufacturing subsidiaries being formed each year was 50% greater than during the previous peak period (1920-1929). By 1965-1967 this average number of manufacturing subsidiaries formed by the very large enterprises was more than ten times greater than between 1920 and 1929 and six and a half times greater than in the immediate post war period".[19]

Throughout these periods the US was the most dominant source of investment. This could be attributed to the fact that the US was the only major economy to emerge from the second world war economically stronger rather than weaker. Figure 2.3.1 below provides an indication of the significant worldwide growth of overseas investment.

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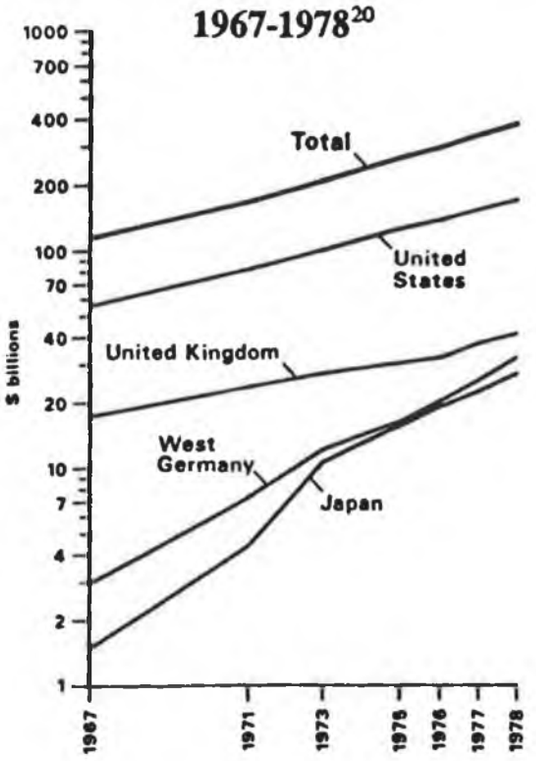
[18] Hood, 1979, p19
[19] Dicken, 1986, p61

Figure 2.3.1

Growth of Overseas Investment in the Global Economy 1967-1978[20]



The peak share of overseas investments was held by the US in the year 1967. In this year $56.6 billion, or 53.8%, of the stock of direct investment abroad was owned by US firms. The UK, West Germany and Japan are indicated as being the next most important sources of overseas investment. In the past multinational investment has been concentrated in developed economies. Developed market economies are, therefore, not only the major source of investment but are also the primary destination. For example, in 1967 31% of the world's direct investment was located in third world countries. By 1975 this share had dropped to 26%.[21] However patterns of overseas investment are not constant. For instance, the relative dominance

[20] Dicken, 1986, p61
[21] Dicken, 1886, p63

of the US as a source of fdi has changed significantly over the past decades. Table 2.3.1 below provides an estimation of the stock of accumulated foreign direct investment by country of origin between the years 1914-1983.

Table 2.3.1

ESTIMATED STOCK OF ACCUMULATED FOREIGN DIRECT INVESTMENT BY COUNTRY OF ORIGIN, 1914-'83[22]										
Country	*1914*		*1938*		*1960*		*1973*		*1983*	
	$m	*%*	*$m*	*%*	*$bn*	*%*	*$bn*	*%*	*$bn*	*%*
USA	2,652	18.5	7,300	27.7	31.9	48.3	101.3	48.1	227	39.6
Canada	150	1.0	700	2.7	2.5	3.8	7.8	3.7	29.1	5.1
UK	6,500	45.5	10,500	39.8	10.8	16.3	26.9	12.8	95.4	16.7
Germ.	1,500	10.5	350	1.3	0.8	1.2	11.9	5.7	40.3	7.0
France	1,750	12.2	2,500	9.5	4.1	6.2	8.8	4.2	29.9	5.2
Belg.	Neg	Neg	Neg	Neg	1.3	2.0	2.2	1.0	6.7	1.2
Italy	1,250	8.7	3,500	13.3	1.1	1.7	3.2	1.5	9.8	1.7
Neth.					7.0	10.6	15.8	7.5	36.5	6.4
Swed.					0.4	0.6	3.0	1.4	10.1	1.8
Switz.					2.3	3.5	7.2	3.4	19.8	3.5
Russia	300	2.1	450	1.7	Neg	Neg	Neg	Neg	Neg	Neg
Japan	200	0.1	750	2.8	0.5	0.8	10.3	4.9	32.2	5.6
Aust.	180	1.3	300	1.1	0.2	0.3	0.5	0.2	3.0	0.4
New Z.					a[23]	a	a	a	a	a
Sth Afr.					a	a	2.1	1.0	6.5	1.1
Other	Neg	Neg	Neg	Neg	2.5	3.8	3.4	1.6	9.0	1.2
Dev. Country	Neg	Neg	Neg	Neg	0.7	1.1	6.1	2.9	17.6	2.6
Total	14,482	100	26,350	100	66.1	100	210.5	100	573	100

[22] Dunning, 1988, p74
[23] No data available

The pre-second world war era was characterised by the domination of the United Kingdom. In 1914 45.5% of overseas stock was owned by the UK compared to 18.5% by the US, 12.2% by France and 10.5% by Germany. By 1960 this situation had changed dramatically with UK dominance having fallen substantially. In this year 16.3% of stock was owned by Britain compared to 48.3% by the US, 6.2% by France and 1.2% by Germany.

By 1983 the position of the US had not changed but the percentage of its world stock had dropped. In this year 39.6%, of accumulated fdi was owned by the US, representing a drop of 14.2% from the peak period of 1967. The UK retained second place with 16.7% a rise of just 0.4% from 1960. The most significant change occurred for both Germany and Japan. Japan's world share rose from 0.8% in 1960 to 5.6% by 1983. The comparable figure for Germany was an increase of 5.8% to 7.0% between 1960 and 1983.

Several factors are attributable to the relative decline of the US. Hood, in his analysis of multinational investment strategies provides some explanation. He comments that

> "1981 was quite an exceptional year for American multinational enterprise overall, with the smallest increase (5%) in the US direct investment position in the post World War II period. With recession conditions worldwide, corporate illiquidity and high US interest rates, American firms had little incentive or ability to make major new investments abroad.

> This fact, plus better borrowing terms abroad, led some companies to help finance their domestic US operations by funds from overseas affiliates".[24]

The importance of the US as a source of foreign investment, however, cannot be underestimated. It remains by far the most dominant investor abroad. While its percentage share of investment abroad may have changed, the patterns of investment have not. Investments have tended, in general, to continue to be made by the largest firms in the higher technology industries.[25]

The choice of location of this investment has, however, changed significantly. On a global scale these firms have diversified their investments towards third world countries while in Europe they have switched from the more peripheral to semi-peripheral areas. In 1956, for example, almost 60% of US manufacturing investment was located in the UK. By 1980 this had fallen to 31%.[26]

The US is not the only significant contributor to overseas investments. Following its destruction in the second world war Japan has emerged not only as a major contributor to overseas investment but also as a serious competitor for both the US and Europe in the electronics industry. In 1960 it accounted for just 0.8% of the estimated stock of foreign investment. By

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[24] Hood, 1983, p17
[25] Casson, 1986, p25
[26] Dicken, 1986, p68

1983 this had risen to 5.6%.[27] Economic policies of the Japanese government did much to explain in part the initial low levels of outward investment in the early 1960's. Firstly, the Japanese government adopted a strongly restrictive policy towards outward investment. Secondly, the low levels of indigenous labour costs effectively discouraged investments abroad.

The late 1960's was characterised as a period of great change for Japan. The Japanese government relaxed its restrictions on overseas investment, the yen increased rapidly in value, labour costs were increasing and shortages of natural resources were apparent. This resulted in a rapid increase in the amount of outward investment.

Direct investment rose from $0.1 billion in 1962 to over $9 billion by the early 1980's. Japanese investment rose on average by 36.7% compared to 10.3% for the US per year over the period 1968-1974.[28] A characteristic of this investment is its concentration in the services industries. Less than 20% invested in Europe, and 33% in the US, was in the manufacturing sector. Another feature of Japanese investment is its tendency to be located in the underdeveloped countries such Asia or Latin America. Only 7% of total investment is located in Europe, 36% in the former and 20% in the latter.[29]

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[27] See Table 2.2.1
[28] Dicken, 1986, p78
[29] Dicken, 1986, p78

2.4 Motivating Factors for Foreign Investment

Several theories identify different reasons why a multinational invests abroad. It may be that their international nature is the reason which prompts multinational firms to establish subsidiaries in abroad. The decision to invest has sometimes been related to a variety of strategic, behavioural and economic considerations.

Strategic motives for the foreign investment decision can be described as those which "...centre on the desire of the firm to preempt its competitors, or gain a strategic advantage over them in its search for markets, raw material sources or technological knowhow".[30] Four critical strategic factors in influencing the strategic motivations for foreign investment have been identified.[31] They consist of market, raw material, production efficiency and knowledge seekers.

Market Seekers can be described as those firms which invest in countries primarily for the purpose of supplying the local market or to export to markets other than that of the home country. Examples of this form of investment are US electronics firms establishing in Europe to circumvent EC tariff and trade quota restrictions.

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[30] Abdullah, 1987, p312
[31] Eiteman & Stonehill, 1989, p246

Raw Material Seekers those firms who engage in investment to maintain a constant supply of materials resulting in their vertical integration. This is displayed by US electronics firms in their acquisition of facilities to mine and refine silicon for wafer manufacture.

Production Efficiency Seekers these firms establish subsidiaries in countries where costs of production are significantly lower than in its home country or where incentives offered, such as low taxes on profits, are less than the perceived levels of risk in making the foreign investment decision. Examples of this are either the investment by electronics multinationals in protected European countries offering incentives or the investment in third world countries offering cheap labour for mass assembly production.

Knowledge Seekers the ability to obtain technical knowledge is a major factor in modern foreign direct investment decisions. Aside from purchasing directly, two other forms of obtaining knowledge are available. One is the engagement in reciprocal licensing, the other is foreign investment. An example of foreign investment for acquisition of knowledge is the increasing propensity of European affiliates to expand, through acquisition, into the US market.[32] The acquisition of US firms by German & French MNE's for their high technology is one such example.

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[32] Kirpalani, 1985, p66-67

While strategic motives are important in explaining foreign investment it is apparent that they are not the only catalyst. The motivation for overseas investment is sometimes behavioural. Unlike strategic motives behavioural motives are the result of either an external stimulus or from within the firm due to personal biases, needs and commitments.

Fear of potentially losing a market, through whatever means, is one example of an external stimulus. Behavioural stimuli were primarily responsible for the establishment of US firms trading in Europe following the creation of the European Free Trade Association (EFTA) in 1958.

Follow the leader, or as it is more commonly the bandwagon effect, can also be related back to a perceived level of fear within a corporation. Firms whose competitors invest in particular locations may feel it is also necessary for them to do so even if the venture is not particularly profitable.

Companies fear that if they do not invest in locations where their competitors are investing they will, over time, lose either their market shares or their previous competitive advantages. There is also the fear that if firms do not invest they risk losing any benefits which may arise from the investment decision that may be transferred back to the parent country for further exploitation. This type of investment can be regarded as a defensive strategy.

The desire to exploit certain advantages specific to the firm may also act as another stimulus resulting in overseas investment. Caves argues that the possession of intangible assets arising from the international nature of the firm act as the incentive to invest abroad. Such assets, generated and retained within the firm, can be described as Ownership-Specific (OS) advantages.[33]

Since these assets are unavailable to any other firm they are the principal source of advantage to the multinational. The decision to invest abroad may be prompted by the desire to exploit these advantages to their fullest potential. For example Dunning notes that "...enterprises engage in production abroad whenever they possess net competitive advantages over firms of other nationalities".[34]

Effective usage of such advantages, via foreign investment, will maximise the profit potential of the multinational, thus acting as a stimulus for investing abroad.

Several additional factors, termed auxiliary motives, for the investment decision have also been identified. These motives do not directly cause the investment decision to take place but would act as a catalyst towards such a decision. The desire of a firm to exploit its technological superiority or

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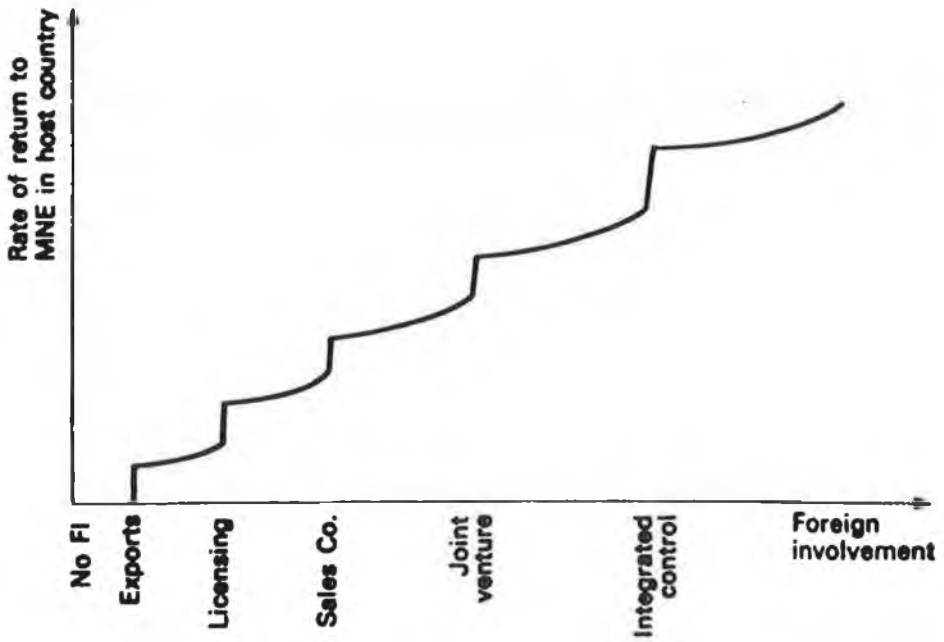
[33] Caves, 1982, p7-8
[34] Dunning, 1981, p98

to spread the perceived level of risk, such as those associated with the high costs of R & D, are generally regarded as the most influential. Other equally important catalysts are evident. The desire of the firm to recapture lost markets, to capitalise on consumers identification with a particular product line or the usage of underutilised resources are examples.

Work by Hymer indicates that the foreign investment decision is purely related to the goals of profit maximisation.[35] Unlike any other forms of overseas contractual arrangements direct foreign investment is perceived to ensure the greatest returns. Figure 2.4.1 below illustrates the rate of return on overseas investment with the degree of foreign involvement.

Figure 2.4.1

Rates of Return Versus Degree of Foreign Involvement[36]



[35] Caves, 1982, p33
[36] Dunning, 1981, p399

The graph clearly illustrates that the greater the degree of foreign involvement the greater the perceived rates of return. To achieve the goals of purely profit maximisation fdi would appear the obvious choice. Though the returns are higher than exporting foreign involvement, by licensing, is in many circumstances discounted. There are two significant reasons for this. Firstly, the perceived rates of return are considerably lower than direct investments. Secondly there are many difficulties in appropriating proper rents from the licensing of proprietary knowledge. This is particularly applicable to higher technology industries,

Difficulties in placing a value on research work combined with the fear of losing monopolistic advantages, if proprietary information is shared, may also remove the incentive to engage in licensing. When such situations arise fdi may prove to be the only viable alternative.

International capital theory was used to explain investment for profit maximisation. It was argued that international production was influenced by the expected returns on capital alone. Multinationals simply pursued the goals of profit maximisation by moving equity capital from countries where its return is low to countries where it is high. The firms profits thus result from capital arbitrage activity. It also proposed that foreign investments do not involve the transfer of any resources other than capital, that is factor immobility.

This theory could in fact be discounted for several reasons. Factor mobility is, as later studies show, very important to the multinational. These 'factors' give rise to specific advantages which enable subsidiaries to outcompete their indigenous counterparts. Therefore while the theory explains why foreign production takes place it cannot explain how it occurs.

The 1950's and early '60's began with new theories which sought to explain how is it possible for MNE's to invest across national boundaries, while others tried to explain the factors in determining where firms established themselves. These hypotheses, which developed independently of each other, were known as industrial organisation and industrial location theory respectively.

Dunning describes the former as concentrating on "...identifying the characteristics of multinationals that give them net competitive advantages over other firms that might otherwise supply the same foreign markets".[37] It was argued that for the investment process to begin some form of market imperfection must occur. These imperfections must occur because if they did not indigenous manufacturers would always be able to outcompete their overseas rivals.

Stephen Hymer, in his doctoral thesis at MIT in 1960, detailed the relationship between market imperfections and overseas investment. This

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[37] Dunning, 1981, p77

theory was later developed, most notably, by Richard Vernon in his product cycle hypothesis. According to the Hymer market imperfections may occur naturally but are more generally attributed to the policies of governments and firms. Anything which leads to the development of a firm specific advantage for the MNE can be regarded as attributing to the creation of a market imperfection. These advantages are derived from a variety of sources of which the most commonly identifiable are :-

(a) the monopoly control of raw materials

(b) the availability of intangible resources such as managerial & research skills. Managerial experience in sourcing raw materials and human capital in other countries may help diminish the innate superior local knowledge of the host country. Through their size and available resources multinationals also have both the ability to generate and spread the perceived levels of risk associated with R & D. With the extremely high costs of R & D in the electronics industry this is an obvious advantage

(c) the availability of production inputs which may be obtained at more favourable rates than for smaller firms

(d) greater marketing expertise, which enables such firms to establish worldwide distribution networks

(e) economies of scale due to ease of obtaining finance or the availability of retained profits

(f) technology

(g) tariffs, or import/export restrictions, by host/home governments

Market imperfections, used in industrial organisation theory, explained much of 'how' it is possible for multinationals to invest abroad. It did not explain, 'where', such advantages would be exploited, that is why a multinational would establish subsidiaries in country A and not B. Industrial location theory, having developed independently of 'organisation theory', tried to resolve the 'where' approach to explaining international production.

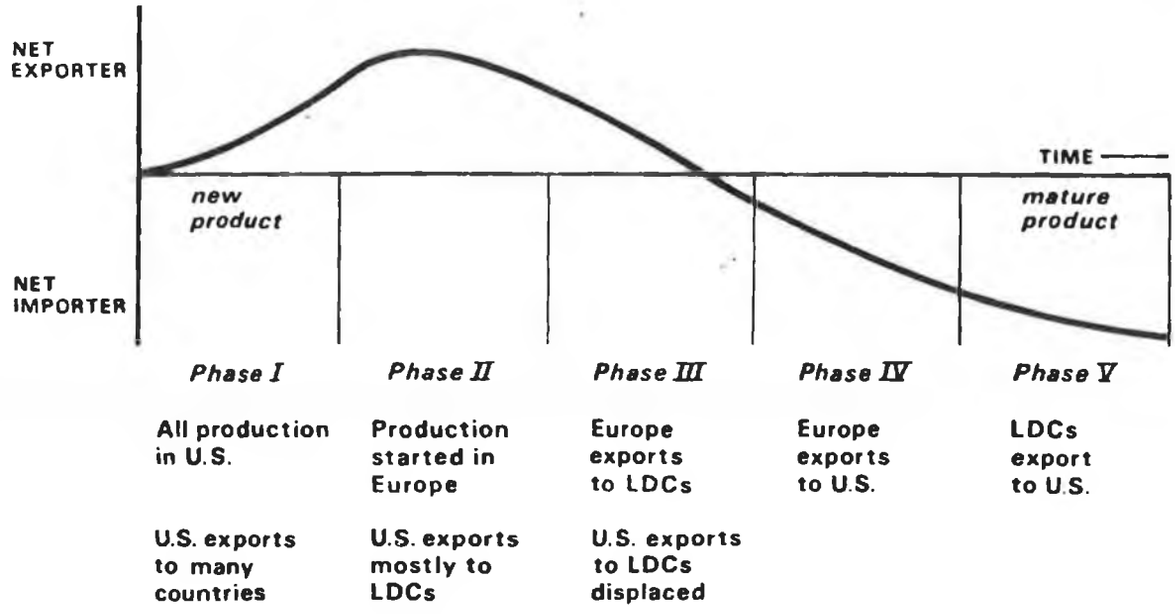
Location theory identifies the factors which influence where an investment is made. While it achieved its objectives of explaining the determinants of the choice of location, it could not explain 'how' foreign firms had the capability to outcompete domestic firms in the supply of their own markets. Neither theory when used independently of each other could completely explain international production. Such partial explanations prompted another path to be followed.

2.5 The Product Life Cycle

The product life cycle (plc) attempted to combine both industrial organisation and location theory to explain foreign investment. Its contribution to the theory of foreign investment was that it successfully demonstrated the interaction of location and ownership advantages. It also introduced a new variable, that of 'when' the investment abroad will take place.

Figure 2.5.1

The Product Life Cycle[38]



The product life cycle was derived by considering an evolutionary approach to the MNE. Phase I starts with the assumption that innovation occurs in the most technically advanced nations. Innovation occurs in these nations as a response to the high overhead costs, such as labour; a feature associated with such economies.

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[38] Dicken, 1986, p130

A critical success factor in the introduction of a new product is the close proximity/ease of communication between producers customers & suppliers. Therefore all production, including exports, would be served from a domestic base.

Phase II of the cycle involves a much more complex process. A combination of factors, the realisation of new markets, greater profitability goals or the emergence of competitors (which effectively initiates a defensive investment) may prompt an investment decision. This can be described as the maturing stage.

Since labour costs were lower and the demand patterns in Europe were relatively similar to those of the US this region was the preferred choice of location for US multinationals. Other factors such as the emergence of a large protected market, for instance, was also a determinant of US investment in Europe. These European plants then supplied the local market, removing the necessity for importing from the US.

Phases III and IV respectively detail the displacement of US exports to the Least Developed Countries (LDC's) and also the importation of goods into the US from Europe; primarily due to lower production costs.

In the final stage of the cycle knowledge and information flows are less important. Products are now sold on the basis of lowest possible cost.

Ultimately elements of production, namely those which are labour intensive, are transferred to places of lowest labour costs - in this case the developing countries. These final stages of the plc consist of the re-exportation of goods from the LDC's back to the US and the eventual demise of the product.

2.6 The PLC & the Electronics Industry

Richard Moxon's study of offshore US electronics establishments in the early 1970's gave some credence to the product life cycle hypothesis. By studying those affiliates operating in the developing countries three central characteristics emerged.[39]

> The firms chose to locate their activities outside the US primarily as a defensive strategy to achieve lower production costs to remain competitive with the Japanese.
>
> Offshore plants specialised in lightweight assembly products capable of being mass produced in a labour intensive environment.
>
> Ease of transportation, back to the US, is ensured since both the products are light & favourable US tariffs exist.

These characteristics correspond precisely to the final stages predicted by the plc. As predicted, innovation in the electronics industry began within the most technologically advanced nation, the US. To successfully compete against mainly Japanese firms production was transferred to low cost labour locations.

The ease of transfer of the technology involved was facilitated by the increased standardisation of electronics products. Such light weight, high value added products are then re-exported back to the US. The final stage,

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[39] Moxon, 1975, p51-66

resulting in the products eventual demise occurred through the degree of technical innovation associated with the industry.

The obvious strength of this model lies in its simplicity and directness. Its ability to explain the manifestation of the US as a progenitor of MNEs in the three decades following the second world war has been described by numerous authors; most notably Casson, Caves and Hood.[40]

Its most significant contribution is the combination of location & organisation theory while also the introducing another variable, that of a time constraint. The late 1960's, however, proved the fallibility of the hypothesis.

[40] Casson, 1985, p8; Caves, 1982, p61; Hood, 1979, p61

2.7 Weaknesses of the Product Life Cycle

Despite the early success of the plc Vernon, in the 1970's, began to question the ability of his model to explain the changing trends of global overseas investment. Like many of the early theories of foreign investment the plc was derived from data based exclusively on US multinationals. This proved inadequate as it could not explain much of the growth of multi-nationals from Europe and Japan. Neither could it explain the growth of those from the Newly Industrialised Countries (NIC's). Vernon noted that because of the emphasis on US the model produced had too narrow a perspective. He commented that

> "...the product cycle sequence relies heavily on the assumption that the special conditions of the US environment - especially factor costs and consumer tastes in the United States - will set in train a sequence that leads step by step to international investment. Though this may be an efficient way to look at enterprises in the US economy that are on the threshold of developing a foreign business, the model is losing some of its relevance for those enterprises that have long acquired a global spanning capacity and a global habit of mind...
>
> By 1970, the product life cycle model was beginning in some respects to be inadequate as a way of looking at the US controlled multinationals enterprise. The assumption of the product cycle model - that innovations were generally transmitted from the US market for production and marketing in overseas areas - was beginning to be challenged by illustrations that did not fit the pattern".[41]

Furthermore the basis of the model, that is multinational formation through a sequence of events, was questionable. Multinationals, through their high

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[41] Dicken, 1986, p131

technological capacities, became capable of developing, maturing and standardising products almost simultaneously. This resulted in the removal of time lags which are an important feature the plc.

Although the life cycle adequately predicted the findings of Moxon's study it could not explain the complex behaviour of multinationals in most industries. All multinationals do not follow the same development cycle. Some, for example, after many years of operation outside their own country continue to rely on the supply of some of their affiliates through exporting from the home base or assembly operations in others.

The plc suggests that after a certain time interval the parent firm would have completely invested abroad rather than export directly to the affiliate. Based on sequential investment, the plc ignores many economic factors which act as disincentives for overseas investment.

To transfer the complete operations of a high technology industry abroad it is necessary that the host country have a similarly high technological base. That is it must have the capacity to generate operations including, for example basic R & D through to process and product development. The plc, however, ignores this and assumes that all forms of production may be transferred abroad independent of the degree of technical innovation within the host country.

Another failure is that the product life cycle predicts that over a period of time the evolutionary process would mark a products decline and eventual obsolescence. While this may be true of some industries, especially those where the rates of technical innovation are high (as seen in some subsectors of the electronics industry) it is not true for all.

While accepting the many failures of his theory Vernon believed that with modifications it still could provide a means of explaining foreign investment. Because he believed that sequential investment was the key to understanding overseas production the plc was subsequently modified.

2.8 Product Life Cycle Refined

The changing patterns of world trade caused Vernon to shift the emphasis to the oligopolistic behaviour of multinationals. Small numbers of large multinationals were now capable of controlling available markets. Like its predecessor the 'refined model' was based on a series of sequential events leading to investment abroad.

Phase I of the newly refined theory attempted to explain the origin of different types of investments between the US and its main rivals in Europe & Japan. European & Japanese multinationals tended to invest abroad for materials savings considerations rather than labour saving reasons as were a characteristic of US investment. Introduced into the theory was the concept of multinationals investing abroad as part of a 'follow the leader' approach.

Phase II involved the usage of the firms production & market power to prevent the entry of competitors. Finally, phase III involved locating production facilities in countries where the costs of production are lowest.

By the mid 1970's, however, the validity of this hypothesis once again began to be questioned. Although the model was capable of describing a general sequence of events it did not provide an indication of the timing or duration of each of the phases.

The main problem associated with any of the plc models is their inherent simplicity. They ignored the possibility that the decision to invest abroad is driven by a complex array of motivations and is not just the result of a simple evolutionary process. By 1979, Vernon had come to realise that certain conditions of the period no longer existed and as such the plc was inadequate.

It was also clear that the concept of using sequential investment, the central core of the hypothesis, to explain foreign investment is inherently flawed. Therefore no modifications to the theory result in any increased applications for it. Certain aspects of the plc have, however, been extended to enable new models of foreign investment to be derived.

2.9 Alternative Theories

Following the demise of the product cycle hypothesis attention was focused in several different directions. Extensions were made to industrial organisation theory whereby an evaluation was carried out to determine which of the ownership advantages was most likely to act as a conduit for foreign investment. However this alone could not explain the 'when' or 'where' of the investment decision.

Work by Lessard at MIT sought to explain the foreign investment process through particular emphasis on the possibilities of risk reduction via diversification. He comments that

> "Managers are particularly risk averse and, as a result, will prefer a more stable stream of earnings to a more volatile one. International diversification provides a natural way to accomplish this since it does not require that the firm diversify into business which it has little expertise".[42]

This theory of international production is extremely general. It does not address the issue of the complex external stimuli for overseas investment and is perhaps best suited to complement other theories rather than attempting to explain multinational formation in unison.

The likelihood that a firm will engage in foreign production rather than to license or sell knowledge/production procedures to overseas firms has also been discussed in terms of market disequilibrium. Buckley et al. argue that

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[42] Eiteman, p280 (Appendix to Chapter 8), 1989

plant location is determined by locational advantages and market failure in the trade of proprietary information, especially that of research and development.[43]

Although all of these theories provide explanations for certain aspects of foreign investment none of them can singularily account for, or describe, all of the issues of foreign investment. Most of the supposed general explanations have been, in fact, partial in nature. Most of the theories have been based on the study of one type of transnational, generally the largest from the US, and conclusions extrapolated to all.

It has been argued that since there are so many different motives for the investment decision the search for a single predictive theory would almost certainly be futile. Because of this complexity attention was switched to seek a more general explanation of foreign investment. Through this Dunning derived what is termed the 'eclectic paradigm'.

[43] Kindleburger, 1984, p40

2.10 The Eclectic Paradigm

From his study of international production Dunning derived the eclectic paradigm. Unlike previous theories it is much more general in format; nevertheless seeking to explain all forms of international production. It is described as 'eclectic' since it draws upon elements of each of the three main lines of explanation for foreign investment over the past two decades.

Dunning describes the model as drawing upon and integrating "...three strands of economic theory to explain the ability & willingness of firms to serve markets, and the reason why they choose to exploit this advantage through foreign production rather than domestic production, exports or portfolio flows".[44]

It draws upon elements of industrial organisation, location and market failure theory and it is relevant to all types of foreign investment. It also embraces the three main vehicles of foreign involvement. These are direct investment, exports and non-equity contractual arrangements; for example licensing.

According to the hypothesis a firm will engage in foreign production only if three conditions are satisfied :-

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[44] Dunning, 1981, p79

(1) A firm possesses certain ownership-specific advantages (OSA) not possessed by competing firms of other nationalities. These advantages may take the form of intangible assets (knowledge, technology, managerial experience and so on) and are internal to the firm alone.

(2) It must be more beneficial for the enterprise to internalise the usage of its advantages and invest abroad rather than engage in licensing contracts or other such agreements.

(3) It must be more profitable for the firm to exploit its advantages from an overseas rather than a home base. The host country must, therefore, posses some location specific advantage.

2.10.1 Ownership Specific Advantages

The first condition which has to be satisfied is that firms must possess certain 'assets' which are internal to the firm. The presence of these assets which are specific to the multinational was first advocated by Stephen Hymer in his study of market imperfections.

The ownership specific advantages of a firm originate "...from their exclusive possession and usage of certain kinds of assets. Unlike location specific advantages ownership specific advantages are those advantages which are internal to the firm. They are those which an enterprise may create for itself or can purchase from other institutions, but over which in

so doing, it acquires some proprietary right of use".[45] They can also be described as the advantages enterprises of one nationality, or affiliates of the same, have over those of another producing in the same location.

Ownership advantages explain why firms consider investment abroad. Since competing firms, in either the home or overseas markets, do not possess these advantages there exists an incentive to exploit them to their greatest potential. Figure 2.4.1 indicates that foreign production would be the preferred choice since it provides the greatest returns on investment.

There are three different forms of this type of advantage. The first comprises of those advantages which any firm may have over another producing in the same location.

The second type of advantage is that which a branch plant of a national enterprise may enjoy over a 'de novo' enterprise, again producing in the same location. Examples are the access to cheaper inputs, knowledge of markets and so on.

The final advantage results from the multinationality of the firm. The greater the degree of multinationality combined with the greater the differences in the economic environments which the firm operates in, the easier it is to take advantage of different country specific characteristics.

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[45] Dicken, 1986, p118

Unlike indigenous firms the multinational can readily assess and choose to locate its operations wherever the advantages are greatest.

Ownership advantages are just one strand of the eclectic paradigm and alone do not explain how a firm can outcompete indigenous rivals. To resolve this Dunning introduces the concept of internalisation.

2.10.2 Internalisation Specific Advantages

Internalisation involves the creation of an internal market by the multinational which can be used by them to avoid being subject to market imperfections when they are the weaker party and to capitalise on them when they are the stronger. Through internalisation of market imperfections the multinational can exploit its ownership specific endowments to their greatest potential.

The greater the imperfection the more the incentive the firm has for internalising the market. If internalisation advantages were not available then the market would be served through licensing and/or the outright sale of knowledge on a contractual basis.

Numerous motivations exist for internalising the market. The theory of internalisation predicts that a firm will undertake foreign production where it is more efficient to do so rather than to use the market or where missing

external markets make it essential.[46] The incentive of a firm to internalise markets for ownership specific advantages may be regarded as a "...response to avoid the disadvantages of distortions or disequilibria in external mechanisms of resource allocation".[47] Internalisation advantages include; the desire to avoid or reduce transaction or negotiating costs, to gain specific advantages over competitors through controlling the supply of inputs, to exploit, or protect against, such market imperfections as government intervention and the protection of property rights & technological know-how.

As negotiations and transactions are performed internally their associated costs can be avoided. Reduction in these transaction costs are regarded by some schools of thought as responsible for the origin of the MNE since it is both the most efficient institution for the minimisation of transaction costs and for transferring technology internationally.[48]

Ownership and those advantages associated with internalisation provide a necessary but not sufficient condition for foreign investment. The possession of these advantages gives a firm the incentive to export to overseas markets, rather than supplying it locally. To explain the choice of overseas production it is necessary for it to be more profitable to exploit the market from a foreign location. The concept of location specific advantages are introduced.

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[46] Rugman, 1982, p57
[47] Dunning, 1988, p22
[48] Buckley & Casson, 1985, p53

2.10.3 Location Specific Advantages

Location specific advantages of either the home or host country are used to provide an explanation for the choice of location of foreign direct investment. Location specific factors can be defined as "...those which are available, on the same terms, to all firms whatever their size and nationality, but which are specific in origin to particular locations and have to be used in those locations".[49]

The choice of location depends on a number of variables. Some of the most commonly identified are size and nature of the market, host government policy towards the multinational, psychic distance and finally labour considerations. Location theory, although explaining the choice of location cannot by itself explain why or how an investment takes place. Dunning, however, inter-relates all three types of advantage to derive the eclectic paradigm and explains international production.

[49] Dicken, 1986, p121

2.11 Explaining International Production

Dunning comments that the "...possession of ownership advantages determine which firms will supply particular foreign markets whereas the pattern of location endowments explains whether the firms will supply that market by exports or local production".[50] The greater the number of OS advantages the more likely the firm is to engage in foreign production.

Therefore, the extent to which an enterprise possesses ownership & internalisation advantages combined with the relative locational attractiveness will determine the likelihood of the multinational engaging in overseas investment. In another form the more OS advantages a country's enterprises posses, relative to its competitors, the greater the incentive to internalise rather than externalise their use from a foreign rather than a home location.

All forms of international production can be explained with reference to advantages derived from internalisation, the choice of location and ownership specific endowments.

Figure 2.11.1 below demonstrates the inter-relationship between the three forms of advantage and displays how the eclectic model, through different combinations of ownership, internalisation & location specific advantages

[50] Dunning, 1981, p48

explains multinational alternative routes of servicing markets.

Figure 2.11.1

Alternative Routes of Servicing Markets[51]

Advantages	Ownership	Internalisation	Foreign
FDI	Yes	Yes	Yes
Exports	Yes	Yes	No
Licensing	Yes	No	No

It is clear from the above that the multinational will be capable of engaging in foreign direct investment only if it possesses all three advantages. If, for example, the market does not possess certain location endowments only then it would be served by the multinational through exporting. Similarly if the multinational does not have the incentive to internalise the market nor is there any locational attractiveness in investing abroad the firm may still wish to appropriate rents from its ownership endowments. In this case the market would be served through contractual means, for example licensing.

[51] Dunning, 1981, p111

2.12 Success of the Paradigm

The success of the eclectic paradigm lies in its ability to explain all forms and changes in international production. Using ownership and the advantages of internalisation the growth of the modern multinational, that is from the 1960's onwards, can be described. For instance the phenomenal growth of US overseas multinational investment can be linked to their desire to exploit ownership advantages internally rather than through the market. The over valuation of the dollar and the greater profitability from internalising the market resulted in overseas production.

Using the concepts of ownership, location specific and internalisation advantages the paradigm has also been used to explain the changes in a country's investment position. According to the paradigm, a country's investment position, can be explained in terms of the extent to which its "...enterprises relative to those of other nationalities, possess ownership specific advantages, which are best exploited within these enterprises, and the locational attractiveness of that country, relative to others, as a site for productive activities".[52]

Similarly it can also be used to describe the changing patterns in the ratio of the outward/inward investment to the UK and US. The rising outward and inward direct capital stake in manufacturing industry in the UK can be

[52] Dunning, 1981, p11

attributed to the increase of the OS advantages of British firms and the decline in the country's locational attractiveness. The falling outward/inward capital stake in recent times in the US can be attributed to opposite forces.

Although there are criticisms of the theory it nevertheless remains, as Dunning has intended, perhaps the most general widely applicable theory of foreign investment. It is through the paradigm that overseas investment in the electronics industry will be described. Ownership and the advantages of internalisation will explain why and how overseas production has taken place, while location advantages will explain in what location investments are most likely to be made.

2.13 Electronics Production & International Trade

Through identifying the various ownership, internalisation incentive and location specific advantages all forms of international production, by all industries, can be explained. It is important to note that these advantages are not independent of each other. The advantages of internalisation, for example, may be directly related to how multinationals exploit their ownership endowments.

Figure 2.13.1 below provides a summary of these advantages.[53] All are not, however, directly applicable to the electronics industry.

2.13.1 Ownership Specific Advantages

Ownership specific endowments are those advantages which are internal to one firm alone. They have been described as originating from three different sources; those which need not arise from the multinationality of the firm, those which branch plants may enjoy over 'de novo' firms and finally those which arise primarily because of the multinationality of the firm. It is the possibility for exploitation of these advantages which prompts overseas investment.

[53] Derived from Dunning, 1988, p27

Ownership advantages are of extreme significance in the highly competitive electronics industry. Such advantages originate from a variety of sources. In such a highly innovative environment the capacity to engage in or generate successful research and development is important. It is through the multinationality of a firm that many such advantages arise.

Since R & D costs in the electronics industry are very high, typically 12% of sales, it is only multinationals which have the capability to engage in research without external assistance. Multinationality yields several advantages. Through their geographical diversification they not only have the ability to position their research departments in any one of a number of locations but they also can spread and subsequently reduce the costs and risks associated with research.

Indigenous firms do not have any of these advantages. They have to undertake research efforts alone, excepting where the provision of state grants exists. Even if research is carried out cost considerations may result in their inability to compete with the multinational. Not alone do multinationals have favourable financial and equipment resources for research they also have the ability to source the best personnel from many different locations. It is because of these ownership advantages, with regards to research, that smaller indigenous firms are forced to seek the smaller market niches not occupied by multinationals.

Due to their size multinationals obtain raw materials at much more favourable rates than smaller competitors. This is important in the sectors requiring large quantities of smaller components, resistors, capacitors and so on. It is also very important for those firms engaged in semiconductor manufacture/fabrication where large quantities of the raw material, silicon, are required. The greater marketing and managerial expertise which is available to affiliates, through the experience of the parent firm, is another source of advantage. The final advantage arises this knowledge/information being available at more favourable rates than others.

2.13.3 Internalisation Advantages

Excepting the internalisation of the market for proprietary know-how the advantages listed in figure 2.13.1 are applicable not only to the electronics industry but to all industries in general. The ability of a firm to internalise the market has been noted as one of the most important factors influencing overseas production.

Through the creation of an internal market those costs associated with negotiations or sourcing may be avoided. Since the electronics industry is based on the successful formation and transfer of knowledge it can be hypothesised that one incentive to form a multinational originates from this source. Because employees of a multinational work under a common corporate culture and share a common identity there is a possibility of eliminating transaction costs. These removal of these costs, particularly

those associated with the transfer of knowledge, explain in part how the investing electronics firm may outcompete indigenous rivals.

Since the electronics industry is characterised as highly innovative and strongly dependent on R & D, multinationals may find it advantageous to internalise the market for proprietary 'know-how'. This occurs for several reasons. Firstly, the firm may find it difficult to place a value on R & D carried out. This occurs because it is unlikely that other firms would have carried out, and sold, similar research work. Furthermore, retaining this knowledge enables the firm to maintain a technological edge over its rivals.

The most dominant incentive for internalisation originates from the desire of the multinational to capitalise on those market imperfections created either by government intervention or problems in attributing costs to research and development.

The non-harmonisation of tax rates between two countries combined with high degrees of intra firm trade enables multinationals to engage in profit switching through what is known as transfer pricing. Different tax rates create advantages for those firms which source their raw materials in one country and process their product in another through an internal market. These firms then have the ability to manipulate transfer prices, those internal prices for (in)tangible assets, and reduce tax liabilities, thus increasing profits. (See Chapters three & six)

Casson in his study of intra-firm trade by US multinationals has identified the relationship between the export and import dependence of affiliates on the parent firm. Figure 2.13.2.1 below provides an indication of the degree of internalisation of markets within the electronics industry.[54]

Figure 2.13.2.1

Export/Import Dependence of Affiliates on the Parent Firm

		Export-dependence of affiliate on parent	
		High	**Low**
Import dependence of affiliate on parent	**High**	Electronic Components Drugs Nonelectrical machinery Non-ferrous metals	Industrial chemicals Instruments Printing and Publishing Miscellaneous plastics Trade
	Low	Transport equipment Radio, television Food Stone, clay, etc. Transport, & communications	Textiles Rubber Ferrous metals Petroleum

According to the study the import dependence is high in the electronics industry. Data from the US Department of Commerce confirms Casson's findings. It revealed that the value of total shipments by US parents to affiliates as a percentage of total shipments by parent to affiliate was 94.7% and 93.6% in the Office & Computing machines and Electronic components sectors respectively.[55] Similar dependencies on the parent firm were indicated in the drugs, non-electrical and non-ferrous metals industries.

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[54] Casson, 1886, p36
[55] Casson, 1986, p32

The significance of these figures is that foreign purchasing may be organised in a way to enable transfer pricing to occur. Furthermore, since it is very difficult to place a value on research work, electronics firms also have the capacity to over/under charge the parent or affiliate. Thus capital can be manoeuvred to achieve other corporate objectives. This may have the effect of providing an incentive for multinationals to internalise markets and invest abroad.

The desire to control the supply of inputs acts as an incentive for internalisation. A notable example is the investment by some electronics firms in industries which may not be their principal activity. One such example is that of some electronics firms diversifying to the mining industry to obtain constant supplies of the raw material, silicon, for semiconductor fabrication.

The above are but a few of the advantages which accrue from the internalisation of the market. As a result of these advantages not only are electronics firms, the most dominant being from the US and Japan, provided with an incentive to invest abroad but they also have the ability to outcompete indigenous rivals. While these advantages explain how firms may exploit foreign markets the choice of location is a separate issue.

2.13.4 Location Specific Advantages

Factors which influence the choice of location of multinational electronics firms can be identified by considering a number of variables. The most important include, size & nature of the market, the policies and attitudes of host governments, differences in social and cultural backgrounds of both home and host country and labour considerations.

Overseas investment, especially over the last three decades, has been strongly related to the size & nature of the host market. The existence of tariffs & import restrictions has been a major determinant in influencing investment in Europe. This large protected market combined with other attractions, increased its likelihood of being exploited by particularly non-EC overseas multinationals.

The ability of a firm to engage in non-tariff trade between EC member countries has, to a large extent, been responsible for much of the investment in Europe by US electronics firms. Establishing in the EC provides these firms with a highly profitable means of circumventing trade restrictions such as tariffs and so on. The policies and attitudes adopted by host governments towards the multinational has several direct and indirect influences on whether or not the enterprise will invest. The semiconductor industry is "...recognised as a key technology with enormous ramifications throughout the economy".[56] Therefore governments who have not adopted a

[56] Dicken, 1986, p332

protectionist strategy towards foreign investment have been keen to attract overseas investment especially in this sector.

The provision of government incentives, such as tax concessions, has been shown to influence the choice of location. Governments have extensively used financial inducements, such as tax concessions or various forms of grants to attract overseas investment. The importance of financial inducements has been emphasised by a wide number of government reports. Indeed it is often argued that financial inducements act as important factors influencing the location of new US manufacturing affiliates in Western Europe.

At present, however, the importance of incentives is subject to debate. With the growing integration of US MNE affiliates in Europe incentives such as tax concessions, government grants and so on have been commented as not very important. The importance of the provision of these incentives in some circumstances cannot be underestimated. Their contribution to the location of multinational electronics firms, especially in the case of Scotland and Ireland, is immense.

Host government attitudes towards profit repatriation, possible abuses of transfer pricing or the degree of local participation in manufacturing operations, that is linkage formation, are other important determinants of whether or not the multinationals will invest. The general political, social and economic environment of a country will affect a firms perceptions of

risk, therefore influencing the location of their manufacturing operations. Electronics is one industry, however, where the economic development of the host country is not always of critical importance. For example if the affiliate has been established to act as an export platform the expectation is that it will perform assembly type operations only. The only requirement is the supply of low cost labour or other adequate incentives.

Differences in the social and cultural backgrounds of both the home and host country play an important role in investment decisions. Major differences in these backgrounds may prohibit multinational investment. This notion of 'psychic-distance' can be used, in part, to explain why most of the initial investments by European or US electronics firms were not in third world countries. Alternatively the similar social and cultural backgrounds is a likely explanation of much US investment in the more semi-peripheral areas of Europe.

Imperfections in the market for labour have been described as one of the single most important location specific advantages. Significant differences are evident if comparing labour costs in the developing nations to those of Europe or the US. In the late 1970's, for example, the average earnings in Singapore was 80 cents per hour as compared to $6.00 in the US.[57] Such differences in wage levels have prompted many electronics firms to try and overcome the problem of psychic distance and establish export platforms in

[57] Dicken, 1986, p124

countries where wage levels are lowest. Although wage levels may be lower in the NIC's it may not be sufficient to prompt foreign investment. The quality or skill levels of the available labour force combined with the nature of the market is also a determinant of how the market will be served. Since electronics is characterised as a high technology industry the availability of a skilled well educated labour force is important. It is especially important if any modifications or ongoing development work is necessary before or while the product is being sold on the market. This explains in part why all overseas investment in the labour intensive computer assembly industry is not located in third world countries.

By combining all three types of advantage the propensity for electronics firms to engage in international production can be explained. The ownership advantages and those arising from internalisation explain why and how overseas investment takes place. The various location specific advantages combined with the motivation for investment explain the choice of location. By identifying the motivations for investment and combining this with multinational behaviour expectations of the operating characteristics of firms may be derived. Examples are the nature and type of operations, the degree of technology transfer and so on.

2.14 Conclusions

Foreign investment can be described as a means of transferring resources across national boundaries. US firms account for the most substantial proportion of this investment, though it has been declining in recent years. In 1960, for example, the US accounted for just under half of all overseas investments, subsequently falling to under 40% by 1983. The combination of recession and competition were the most influential factors which caused the decline in the US levels of outward investments.

Japan and Germany accounted for the most significant increases over this period, the former exhibiting an increase from 0.8% to 5.6% while the latter increased from 1.2% to 7.0%. While the UK has retained its position as the second most important contributor to overseas investments its share has fallen by the most substantial amount, from 45.5% in 1914 to 16.7% in 1983.

The motivations for engaging in foreign investment are related to a complex series of stimuli, both internal and external, to the firm. These stimuli can be described as either strategic or behavioural. Strategic motivations centre on a firms desire to pre-empt competitors, obtain raw materials and so on. The fear of potentially losing a market is another example of a strategic motivation. Behavioural motives range from the bandwagon effect to the desire to maximise the gains from the exploitation of ownership specific endowments. The establishment of the EFTA, and later the EC, is a

particularly important stimulus since it is responsible for much of US investment. While both the motivations explained much of why overseas investments are made they do not explain how the investing firm can outcompete indigenous rivals or in what location the investments will be made.

Industrial organisation theory, through the concept of market imperfections, explains specifically much of 'how' it is possible for multinationals to invest abroad. Location theory details the factors which prompts the choice of location. It does not explain 'how' an investment occurs. Neither theory, when used independently, could explain the patterns of overseas investment. These partial explanations prompted the development of the product life cycle which not only combined industrial organisation and location theory but also introduced the concept of a time variable.

While the plc had its applications, for example explaining investment by US affiliates in the electronics industry in third world countries, it could not explain many of the newer forms of investment; particularly those from the NIC's. The concept of sequential investment proved to be inherently flawed and as a result the model abandoned. The process of deriving a rigid model to explain foreign investment was rejected and a more general theory sought. Through this Dunning derived the eclectic paradigm.

The paradigm draws and integrates upon three different aspects of economic theory. It proposes that only through the combination of ownership, internalisation and location specific advantages can a multinational invest abroad. If the firm does not possess all three types of advantage it may still, however, exploit the market through exporting or licensing. The paradigm was applied to the electronics industry and each of the three types of associated advantage described.

Since electronics is a highly innovative industry one of the most important ownership advantages is the capacity to undertake and spread the perceived levels of risk associated R & D. Their ability to source raw materials and personnel provides them with another key competitive advantage.

Several equally important motivations for internalising the market were discussed. The first was to capitalise on government created market imperfections while the second was the internalisation of the market for technological know-how.

The final type of advantage, i.e location specific advantages, described why a firm would invest in one country rather than another. The most important locational advantage is the size and nature of the market. Tariffs and import restrictions associated with the EC were described as the most important factors influencing investment, particularly from the US, in the electronics industry. Government incentives packages, psychic distance and the

availability of relatively cheap manual labour are other strong determinants of the choice of location of electronics manufacturers.

Through the combination of these advantages investment by electronics firms of any nationality in a particular location can be explained. Similarly the paradigm, through studies of relative country-specific endowments, may be used to determine if a location is likely to be able to attract overseas electronics investment. It may also be used in some cases, using the same principle, to determine if firms which have invested are likely to remain in that particular location.

CHAPTER THREE

THEORY OF MULTINATIONAL BEHAVIOUR

3.1 Introduction

This chapter details several of the key aspects of multinational behaviour. Section 3.2 introduces a discussion on the possible abuse of transfer pricing by multinationals. This is a source of much contention between these firms and either home or host countries. By abusing this pricing mechanism multinationals have, among others, the capacity to manipulate profits.

There are constraints, however, which may act as disincentives towards this abuse. Some are internal while others are external to the firm. A summary of them is given in section 3.5. The final section concludes with some empirical evidence for the abuse of transfer pricing.

The latter part of the chapter details multinational behaviour with regards to the transfer of technology. Apart from direct employment creation one of the benefits for host countries from multinational investment is that technology will be transferred to the local economy. This is one of the most desirable aspects of multinational investment since if sufficient technology is transferred it can result in indirect employment increases through the formation of indigenous spin-off firms.

Technology transfer occurs through three principal mechanisms; the establishment of research facilities, licensing or linkage formation. Each of these is discussed with respect to the electronics industry in the context of the general theory of multinational behaviour.

3.2 Defining Transfer Pricing

Following the rapid increase in international trade by multinationals over the past decades so too has the degree of intra-firm trading. Associated with the rise in intra-firm trade are various phenomena related to the abuse of transfer pricing. In some cases this has caused much friction between tax authorities and those multinationals who are accused of fraudulent activities. Transfer pricing itself is a functional part of the day to day operations of the multinational. It is defined in many forms with each having certain common attributes. Some of these are :-

> "...fixing the price used for the transfer of goods and services from one organisation to another where one management has effective control over both..."[58]
>
> "...the establishment of administratively determined prices for intracorporate exchange of i/p's, services & technology..."[59]
>
> "...the TP is the price at which a transfer or sale of goods takes place within a firm regardless of whether or not the firm spans different countries..."[60]
>
> "...the unit price assigned to goods & services between the parent company & subsidiaries or between divisions within the same firm..."[61]
>
> "...the pricing of goods and services that pass between related parties, such as parent and subsidiary..."[62]

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[58] Boston, 1978, p42
[59] Abdullah, 1987, p222
[60] Hood & Young, 1979, p190
[61] Gabor, 1988, p113
[62] Daniels, 1982, p569

Common among all definitions is that the transfer price is the value to which management places on the transfer of assets, intangible or other, from parent to affiliate regardless of whether or not the firm spans different nationalities. It is an accountancy practice which provides a legitimate means of evaluating costs of services to the parent or affiliate.

In many cases the appropriation of a proper transfer price between different units of a vertically integrated firm are both country or industry specific, that is no external market price exists. Obtaining a price for intangible assets, such as knowledge, passed between parent and affiliate is but one example. Problems in its evaluation provide firms with the capacity to manipulate them to achieve corporate objectives. This is discussed in subsequent sections.

3.3 Uses of Transfer Pricing

The legitimate use of transfer pricing is the placing of a value on tangible or intangible assets which are transferred between affiliates of the same company. It is not the only one however. Although the management function has many goals it is that of profit maximisation which is most important. Some studies have commented that transfer pricing is most closely related to this aim.[63] Through the manipulation of these prices multinationals have the capacity to avoid, among others, high customs duties or indeed any other forms of government related costs.

The large degree of intra-firm trading often raises the question of whether or not transactions are of value equal to the free market price.[64] Through intra-firm trading and transfer pricing a firm may increase its profits, reduce foreign exchange risk or take full advantage of government policies in a number of ways.

A possible use is to reduce the impact of high import duties. It is perceived that companies may benefit, all things being equal, through placing a low transfer price on goods entering into a country with high import duties. Other motivations for distorting the transfer price exist. Benke comments that "...by far the most persuasive objective in international transfer pricing is tax minimisation...".[65]

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[63] Benke, 1980, p20
[64] MacCharles, 1987, p66
[65] Benke, 1980, p114

Worldwide corporate profits may be greatly influenced by manipulating transfer prices to shift profits from countries with high tax rates to countries where rates are low. Parent firms can undercharge those affiliates in low tax locations for goods and services. These affiliates in turn can sell at a much higher than market rates to associated firms, thus centering profits and reducing overall tax liabilities.

Of course governments who face potential revenue loss have enacted various safeguards to prevent this. However, Hood et al. comment that "...while there are constraints from customs and taxation authorities when pricing goods and services across international boundaries, the MNE can frequently determine prices on a purely accounting basis in order to maximise overall profits".[66]

Another application of transfer pricing is for what is commonly termed as 'fund positioning'. This involves the positioning of funds in locations that will suit management capital policies. A multinational wishing to remove funds from a particular location may do so by charging a higher transfer price to affiliates for goods sold. This pricing mechanism can primarily be used if there are any restrictions on profit repatriation.

[66] Hood & Young, 1979, p108

3.4 Problems in Appropriating Proper Transfer Prices

It is estimated that the practices of the abuse of transfer pricing in the US alone rob tax authorities of in the region of $13 billion to $30 billion a year.[67] The primary problem for customs and tax authorities is the difficulty in appropriating transfer prices, especially for intermediate goods and knowledge, which as commented are sometimes both industry and country specific. This problem is especially prevalent in the higher technology industries where difficulties arise in payments for marketing, research & development expenses and so on.

These substantial losses prompt tax authorities to use a variety of means to evaluate proper transfer prices. US tax authorities, for example, use section 482 of the internal revenue code to determine appropriate transaction costs. It enables the IRS (Internal Revenue Service) to "...reallocate gross income, deductions, credit or allowances among the parent company & its affiliates so as to prevent tax evasion".[68]

Although this law may hope to act as a disincentive for transfer pricing it has the disadvantage in that it uses free market 'arms-length prices' to evaluate transaction costs. These prices are defined as "...the amount that was charged or would have been charged in independent transactions with unrelated parties under the same or similar circumstances considering all the

[67] Gleckman, 1990, p48-49
[68] Abdullah, 1987, p162

relevant facts ...."[69] The underlying problem remains as to the evaluation of the costs of goods on an external market which are either very difficult to measure or do not exist at all. Since no other pricing mechanism exists several methods are used to overcome these problems are determine mutually acceptable transfer prices.

Three different methods are commonly used. Each, however, has associated disadvantages. They are 'comparable uncontrolled prices', 'resale price' & 'cost plus'.[70] Comparable uncontrolled prices involves placing a price on the transaction that would naturally occur if the transaction was carried out between two independent party's. In theory it is expected that this pricing mechanism would be easiest to apply. In practice, however, differences in quality, quantity or brand names result in direct comparisons difficult to measure.

Rejection or inapplicability of this price leads to the resale price used. This is calculated on the sale price charged by the distribution affiliate less an appropriate profit margin and other expenses incurred. This method is most applicable in the case "...of a manufacturing operation in one country selling to a sister affiliate in another."[71] It is this pricing mechanism that one would expect to be used in determining transfer prices by overseas electronics firms in Ireland, since as Chapters four & five note, Irish

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[69] Reg.Sec.1.482(d)3 of the IRS code
[70] OECD, 1979
[71] Ernst & Young, 1991, p11

subsidiaries are used both as manufacturing affiliates and as stepping stones into Europe.

An obvious problem exists with this method and is the difficulties which arise in determining an appropriate markup when the purchasing affiliate adds substantially to the value of the product. Failure of either of these methods results in the cost plus price used.

This is calculated as the cost incurred by the manufacturing affiliate plus an appropriate mark-up based on the industry's average margin. Again the problem remains as to determining an acceptable mark-up price. Such difficulties effectively give the multinational the capacity to increase profit margins through transfer pricing.

The pricing mechanism, or lack of, in determining prices for intangible assets is used, particularly by US affiliates, to switch profits. Abdullah, for example, notes that many countries "...consider the scale of fees charged for engineering or managerial services charged by US MNC's to their affiliates as exorbitant".[72] Industries such as chemicals and electronics, who require considerable expenses on R & D which generally are company specific, have the greatest capacity to manipulate prices in this way.

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[72] Abdullah, 1987, p163

Because of the various constraints on tax authorities it would appear that multinationals, if they so wish, easily have the capacity to circumvent the various regulations to achieve the corporate goals of profit maximisation. One can determine, however, many constraints which are either internal or external to the firm that may act as disincentives for the manipulation of transfer prices.

3.5 Constraints on the Abuse of Transfer Pricing

There are many constraining factors which would limit the advantages accruing from the abuse of transfer pricing. Although a multinational may, for example, use them to overcome high import tariffs it may well find that the income tax rates in that country are higher. The exporting company has, therefore, to consider income taxes in both countries and also the import duties in the recipient country. This delicate process of 'balancing the books' may result in a disincentive for firms to try and circumvent the various tariffs.

Government intervention may also act to remove the capacity of the multinational to use high/low transfer prices. In some instances customs authorities used internationally posted prices for the goods imported and not the price appearing on the invoice form.[73] To maintain smooth working relationships with host governments, who generally offer various types of incentives packages, the multinational may be forced to abandon plans to manipulate profits because of the potential scandals involved.

Other factors, predominantly internal to the firm, exist and act as possible disincentives. Obtaining a suitable transfer price within a common affiliation of companies could result in multiple objectives conflicting with each other. Individual subsidiaries generally regard and act themselves in a manner to

[73] Eiteman, 1989, p56

achieve the goals of profit maximisation. These subsidiaries would effectively regard themselves as individual profit centres. Consequently their performance is assessed individually. When purchasing raw materials management of these companies will look for the best deal for his/her division or firm. He may not wish to pay higher costs to a group supplier thus harming profit performance and perhaps reducing their reputation in the eyes of corporate management. This reluctance may cause conflict within the organisation and negate prospective advantages from transfer prices.

Corporate management would argue that what is good for one firm may not necessarily be good for the company as a whole. Management of individual subsidiaries may therefore be forced to buy from certain suppliers at certain prices. Such forced purchasing, or the necessity to reduce local profits, create a severe demoralising effect for management and subsidiaries alike.[74]

The fundamental problem in establishing if any abuse does occur is related to difficulties in obtaining evidence. One method to determine its existence is to perform case studies. These studies, however, are unlikely to reveal the existence of, for example, profit switching transfer pricing since executives are very much aware of the legal implications involved and the necessity to continue smooth working relationships with host governments.

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[74] Caves, 1982, p246-247

3.6 Evidence for the Abuse of Transfer Pricing

Evidence for the abuse of transfer pricing has been described as at best "... partial and impressionistic", others commenting that the gains associated with it are small relative to the potential scandal which could be created or more generally "...many companies find the gains from transfer pricing manoeuvres to be small relative to the administration costs and risks involved".[75]

Studies show, however, that the gains from transfer pricing can be quite substantial. For example Hoffman La Roche earned 76.5% of its income from its British affiliate in the form of setting a high transfer price for the raw materials imported from the group. This was achieved through certain imported drugs priced to the affiliate at $370 & $920 per kilo even though the same amount could be bought on the open market for $9 & $20 respectively.[76]

Case studies, though generally difficult to accomplish, of the pricing strategies of multinationals have ascertained that transfer prices are used to some degree for the minimisation of corporate liabilities.

Figure 3.6.1 below details the results of a series of case studies of the pricing strategies of US multinationals and shows the usage of transfer pricing.

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[75] Dunning, 1981, p31; Ghertman & Allen, 1984, p88; Caves, 1982, p248
[76] Hood, 1979, p209; Dunning, 1981, p208

Figure 3.6.1

Frequency of Use & Transfer pricing by US multinationals[77]

FREQUENCY OF USE	NUMBER OF RESPONDENTS	MOTIVATION	NUMBER OF RESPONDENTS
Very frequently	0	Fund positioning	11
Frequently	6	Tax considerations	21
Occasionally	18	Cash flow considerations	12
Seldom if at all	17	To deal with problems relating to tariffs and quotas	3
Not used	38	Managerial incentives	1
Total	179	Bargaining power with suppliers or financial institutions	0
		Market and competitive conditions in the foreign country	6
		Other considerations	3
		Total	57*

* A number of respondents must have checked two or more motivating factors, as only 41 respondents said that they used transfer pricing with varying frequency.

Seventy percent of the survey respondents indicated that they did not use or seldom used transfer pricing to facilitate the transfer of funds between affiliates. Eighteen of the firms noted that they used transfer pricing occasionally. Just six firms indicated that they used it frequently. These responses are not unexpected as admission of frequent usage of the abuse of transfer pricing would not enhance working relationships between governments, legal authorities and so on.

The survey results do, however, indicate that of those firms who engage in transfer pricing the majority do so for, as expected, tax considerations. Twenty one of the respondents indicated that they did so for this purpose. Twelve and eleven firms do so for cash flow and fund positioning respectively.

[77] Abdullah, 1987, p223

Case studies are not the only mechanisms for determining the extent of the abuse of transfer pricing. If for example an analysis of similar firms operating in different countries yields exceptionally high profit margins for some it may give an indication of the existence of profit switching transfer pricing.

A final point which is worth noting is that the practices of transfer pricing may not necessarily be entirely unwelcome by all governments. Multi-nationals in determining appropriate transfer prices will, quite obviously, take government attitude towards it into account. Government policy may be such that it is not necessarily disturbed by what has been described as the apparently fraudulent activities in the pricing strategies of multinationals.

Those countries seeking overseas investment may in fact not impose any measures to actively discourage the centering of profits. It may be more beneficial for the host country not to do so. If a government imposes a low rate of corporation tax it may entice multinationals to centre their profits in that location. This would result in an increased 'tax-take' for governments than if transfer pricing was actively discouraged and higher tax rates existed. It may also act to create a stimulus for the initial overseas investment resulting in the long term creation industrial employment either directly or through spin-offs.

3.7 Multinationals and the Transfer of Technology

The concept of technology transfer is a complex issue. The problem is particularly difficult given the large number of variables involved. Consideration must be given to the nature of the technology to be transferred, host country development and so on.

The problem is further complicated since it is impossible to define technology in an objective, unambiguous manner. It is described as "...a rich and multi-faceted concept which does not admit a simple definition".[78] Nevertheless if one considers that technology embraces all kinds of human and non-human capital, that is tangible and intangible assets, one can begin to describe the relationship between the multinational and the transfer of technology.

Multinationals are often criticised as not contributing sufficiently to the host economy through technology transfer. One must consider this, however, in the context of the theory of foreign investment and multinational behaviour. These corporations originate from, and sustain their growth, through the internalisation of their ownership-specific advantages. Since the internalisation of such advantages is at the heart of multinational activity the likelihood of a multinational firm transferring its key competitive advantages to a host country is extremely remote. It is also likely that the terms of any

[78] Robinson, 1988, p3; Blackeney, 1989, p1

technology which is transferred is likely to be strongly dictated by the MNE to suit its policies and interests and may not be necessarily in the best interests of the recipient country.

Some studies have shown that even if technology is transferred it may result in a high net cost to the local economy.[79] It is argued that if multinationals were relied upon too heavily, for technological innovation, it could lead to a position whereby the host country becomes technologically dependent on other nations. Fears were also expressed in relation to the effects of technology transfer on the balance of payments because of royalty and other remittances back to the parent firm.

While concern may be expressed of either the lack or the nature of technology transfer it is plausible to suggest that the multinational is an important agent in providing a means for the transfer of technology.

Dicken, for example, describes foreign direct investment as traditionally being one of the most important channels of technology transfer.[80] Other studies show, with particular reference to the higher technologies, that while multinationals are not responsible for technology production in the host economy they nevertheless are important agents of its transfer.[81]

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[79] Hood, Hamill & Young, 1988, p69
[80] Dicken, 1986, p361
[81] Chen, 1983, p63

Potential benefits from the transfer of technology arise from several sources. Four of the most commonly identifiable are listed below.[82]

(a) The transfer of advanced product/process technology

(b) Local technology creation via subsidiary R & D

(c) Technology diffusion and indigenous 'spin-off' &

(d) Improved competitiveness and quality of employment

It is the structure of the multinational which is primarily responsible for enabling the transfer of advanced product/process technology. Transfers of technology between employees of the same firm are possible because they "...share a common corporate culture, and this makes it easy for them to learn from one another".[83] Production costs are greatly reduced since affiliates may draw upon the research efforts of the parent company thus limiting the effect of uncertainty in the costs of new product development.

Research efforts which are carried out by the parent firm may be of benefit to the local host economy since it may be transferred via linkage formation. One example is the growth of the European microelectronics & semi-conductor industry over the previous two decades. This growth has been directly attributed to the establishment US multinationals who have transferred technology through their affiliates.

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[82] Hood, Hamill & Young, 1988, p69
[83] Hertner & Jones, 1986, p44

Obviously, the presence of a multinational cannot, by itself, guarantee the transfer of technology. To identify if the multinational will transfer technology, consideration must be given to the specific motivations for investing in the particular location. If, for example, the multinational was established primarily for the purpose of creating an export platform, or particularly for tax concessions, then it is unlikely that local R & D centres will be established.

Alternatively if a multinational chooses to locate its key business functions in the host economy the advantages are many. Most importantly it has the effect of increasing the local skills profile of the workforce. This gives individuals the capacity to consider forming their own firms, that is 'entrepreneurial start-ups'. In effect such overseas firms may be regarded as 'incubator' organisations for indigenous spin-off firms. These start-ups are perceived to be the most significant indirect effect of multinationals investment.

The transfer of technology may take many paths. Indeed Robinson lists sixteen different possible types.[84] Four of the more important are listed below.[85]

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[84] Robinson, 1988, p5-6
[85] Hood, Hamill & Young, 1988, p70

Foreign technology to foreign owned establishment (inward investment in new start or expansion; wholly-owned subsidiary or joint ventures)

Foreign technology to indigenous establishment (whole range of non-equity agreements)

Employees to new start (employee spin off from existing enterprises, indigenous or foreign owned)

Technically advanced company to subcontractor; linkage formation (improvement in standards and techniques of subcontractors through own efforts or through assistance of contracting enterprise)

This degree of technology transfer from the first mechanism is generally governed by the motivation for investment. In fact it affects the last two of the remaining three mechanisms for technology transfer. If, for example, a primary motivation for the investment decision was to avail of low rates of corporation tax it would effectively remove the incentive for the formation of R & D and marketing centres in the host country since their associated costs would reduce pre-tax profits and displace the initial investment incentive. This would also apply to the establishment of any other key business functions.

The second form of technology transfer is through licensing agreements and is industry specific, with higher technology firms showing greater reluctance to use them. The third mechanism is through spin-off firm formation and is discussed in the survey chapter. It is directly related to the motivation for investment since if firms do not locate business functions in the host country

it removes the capacity for individuals to gain sufficient experience to engage in entrepreneurial start-ups.

The motivation for investment also affects the degree of linkage formation since firms who invest for establishing an export platform generally do not source to any significant degree locally. The degree of linkage formation is also affected by, among others, the type of industry, host country development and so on.

The following sections discuss the theory of multinational behaviour in relation to licensing, the degree of research and development likely to be carried out in the host country and finally the probability of firms engaging in linkages.

3.8 Multinationals and Licensing

The multinational has at its disposal several mutually exclusive channels to permit the transfer of technology; "...sale of know-how to an unrelated party, use of the technology in a facility partly owned by the technology owner, or use of the know-how in a facility wholly owned by the technology owner".[86] It is the first channel, that is licensing, which is discussed in this section.

Licensing may be defined as "...the sale of manufacturing technology by a multinational enterprise to a non-controlled entity located outside the home country of the MNE".[87] It provides a firm with the means of exploiting its ownership specific endowments if it does not wish, or cannot, engage in direct foreign investment. Licensing, however, provides an inadvisable alternative to direct foreign investment.

The reasons for this are partly related to expected rates of return from exploitation of ownership advantages. Figure 2.4.1 demonstrates that the potential returns from licensing are lower than those from foreign investment, though higher than from exports. Two broad reasons have emerged which explain why a multinational, complete with its array of resource endowments, would engage in licensing and lose potential profits & perhaps also risk losing certain ownership advantages rather than engage

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[86] Stobaugh & Wells, 1984, p10
[87] Stobaugh & Wells, 1984, p178

in foreign investment. The first is to substitute for fdi when licensing proves to be more profitable or to gain access to technology of other firms through reciprocal grants of licenses.

The second is directly related to the theory of foreign investment. Direct investment occurs only when a firm has the incentive to internalise the use of its technology. If no such incentive exists the multinational cannot exploit its technological resource endowments. Rather than lose potential income it may choose to appropriate rents through licensing, since unlike the outright sale of knowledge licensing retains some proprietary control.

Caves and Rugman provide a similar analysis of licensing as a means of market penetration as opposed to foreign investment. Their studies indicate which factors are most important in determining whether or not foreign investment or licensing will occur.[88] The most important findings are discussed below.

- Market size is an important factor which is obviously taken into consideration when investing abroad. Small market size may result in it being unprofitable to establish affiliates abroad. A firm still wishing to exploit this market may find licensing the only alternative. Non-equity agreements may also be used for the dual purpose of market penetration and the reduction of risks associated with such investment.

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[88] Caves, 1982, p204-206; Rugman, 1982, p261-262

- Licensing may be the preferred method of market entry if the licensor does not posses the appropriate knowledge or experience in dealing with foreign markets. This 'knowledge' may be constituted of a variety of factors. The most obvious are managerial experience in dealing with overseas markets, the ability to source raw materials or knowledge of local customs.

- It may be the preferred method of entry where the rate of technological innovation is high and in consequence product life cycles are short. Because of this it may be difficult to establish a subsidiary and begin production before the product becomes obsolete. This is applicable to certain subsectors of the electronics industry namely computers or the manufacture of some semiconductor devices.

- Multinationals may also license abroad for reciprocal access to technology. Empirical work by Telesio revealed that just under 35% of firms who engage in licensing do so for this reason.[89] This form of licensing can help in the technological development of high technology industries. It is useful for a variety of reasons. Firstly it prevents firms in an industry who refuse to license or sell key technologies from blocking the development of the industry as a whole. It may also be used to spread & reduce the costs of R & D. Reduction in these costs may occur since it helps eliminate the duplication of some research. At the same time risk reduction may be

[89] Stobaugh & Wells, 1984, p181

achieved since no one firm can be denied access to vital new developments within the industry.

Licensing does not always permit a firm to transfer some of its business activities abroad and many disadvantages to it exist. Some economists regard contractual arrangements such as licensing and joint ventures to be fraught with danger for the MNE. Rugman, for example, comments that an "...inappropriate form of non-equity involvement has the potential to destroy the firm-specific advantage of the MNE, without which it ceases to be a monopolist and runs the risk of fading away into nothing".[90]

It is perhaps too extreme to write that licensing technology abroad, alone, could cause a multinational to fade away into nothing. There is, for instance, no necessity for a firm to engage in licensing. A well managed firm that does engage in licensing would be aware of the potential losses/problems and could take the appropriate countermeasures through placing adequate safe guards in the licensing contract.

Disincentives may also exist because of problems relating to the appropriation of proper licensing fees. The main disadvantage, however, is that licensing fees are likely to provide considerably lower returns than direct investments. Other disadvantages include possible loss of quality control, establishment of a potential competitor in third country or the

[90] Rugman, 1982, p15

possible lost opportunity to enter the market through direct investment at a later time. The fear of losing the technological edge over competitors is another fear.

Complications can also arise where the transfer of technology involves complex processes or products. Such difficulties may arise since the technology has to be transferred between two different corporate cultures. Therefore the expectation is that licensing will be more common the less complex the goods. The more international an industry the less are markets separated by tariffs and other transaction costs. Such firms would probably have the experience and know-how to exploit the market directly and would probably engage in fdi rather than licensing.

Since electronics manufacture is a complex process and the fact that these firms are generally internationally diverse it leads to the expectation that licensing would not occur in this industry and if it does it will probably be reciprocal. Such large firms would probably have the capacity to exploit the markets themselves.

While licensing provides a means for firms to obtain new products without any research expenditures many of the associated potential advantages derived may be lost for a variety reasons. For example, many restrictions may be placed on the licensing agreement. Apart from having to bear the costs of royalty payments the licensee may have to grant back to the

licensor "...any improvements made in the process or product; will not export to certain markets or will otherwise refrain from competing in the licensors product markets".[91]

Therefore even if multinationals are willing to license their products firms may not avail of them because of the restrictions involved. In the more complex industries, such as electronics, further complications would suggest that licensing would not be responsible for any significant proportion of transferred technology.

[91] Caves, 1982, p201-202

3.9 Multinational Behaviour and Research & Development

Research and development is the most important factor affecting both the production of technology and the propensity of a firm to engage in foreign investment. The explanation for the engagement in foreign investment, as a result of accumulated knowledge resulting from R & D, can be related back to the eclectic paradigm through the concept of internalisation of owner specific advantages. Full exploitation of this knowledge may only be achieved via foreign investment where maximum returns may be obtained.

Research and development is subdividable into two distinct elements. Research may be define as "...that part of the process dealing with invention whilst development is concerned with taking the idea and turning it into a commercial product".[92] Research also consists of two other components, basic and applied research.

Basic research can be described as an "...original investigation undertaken in order to gain new scientific knowledge and understanding.[93] Pure basic research is not directed to achieving any specific practical aim. It is aimed at appeasing scientific curiosity and providing a scientific base for future reference. Orientated basic research is different in that the investigator is directed towards a specific aim by the employing organisation.

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[92] Dumbleton, 1986, p1
[93] Dumbleton, 1986, p8

Since it is difficult, if not impossible, to determine the potential profits from basic research it is not surprising to find that private industry devotes relatively small amounts to it. In the US typically only 15% of the finance available for R & D is devoted to basic research.[94]

Applied research is an original investigation undertaken to gain specific or technical knowledge. Unlike basic research it is directed towards the achievement of a practical aim or objective. This form of research, as the name suggests, is directed towards the application of specific knowledge.

Development is regarded as the most important aspect of R & D to private industry. It is defined as the "...usage of scientific knowledge in order to produce new or substantially improved materials, devices, products, processes, systems or services".[95] Its importance is reflected by the fact that just under seventy five per cent of US private industry research funds was used for development purposes.[96]

Studies of multinational behaviour generally lead to the conclusion that firms prefer the centralisation of their R & D facilities. This would sometimes appear a contradiction in terms since it may not be the most ideal cost minimisation position. This 'forced positioning', as described by Hood et al., is the result of certain pressures within or outside of the company.

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[94] Baumol & Mansfield, 1980, p20
[95] Dumbleton, 1986, p8
[96] Baumol & Mansfield, 1980, p20

They cite the problems associated with the financial control of R & D budgets, the high costs of communication and prevention of information leakages as reasons for centralisation. Since R & D costs, especially in the higher technologies, is extremely high there is also a need for the policing of potential divergence from central product policies.[97]

Because the electronics industry is by nature highly competitive the necessity to prevent information leakages is extremely important. This leads to the expectation that for this reason research departments in this industry will be highly centralised.

Structure of the organisation is another important variable in explaining whether or not (de)centralisation occurs. Firms with a strongly centralised management ethos are probably better off with minimal overseas activity, unless some irresistible benefits exist. Since research plays such an extremely strategic role in the development of the electronics industry it is therefore imperative that a close interface is maintained with it and top corporate management. Through centralisation the corporation can closely monitor and efficiently control its research operations.

One possible reason for decentralising research centres is where low cost locations are available. Data, however, indicates that the costs of R & D units are geographically broadly similar. Table 3.9.1 below represents the

[97] Hood & Young, 1979, p118

mean ratio of the cost of R & D units in Europe, Japan & Canada to that of the United States.

Table 3.9.1

MEAN RATIO OF THE COST OF R & D UNITS IN EUROPE, JAPAN & CANADA TO THE UNITED STATES; 1965-'75[98]				
Year	*US*	*Europe*	*Japan*	*Canada*
1965	1.0	0.68	0.56	0.82
1970	1.0	0.74	0.60	0.86
1975	1.0	0.93	0.9	0.96

This data formed part of the results of a study of overseas research facilities by US based firms through 1965-1975. The data indicates that by 1975 the costs entailed in performing R & D in all geographical regions was very much similar. On cost considerations alone it is unlikely that US firms would perform research abroad to any significant degree.

Since a significant proportion of the electronics firms established in Europe are US owned the consequences are obvious. Combining the difficulties in decentralising R & D functions with cost considerations leads to the expectation that the levels of multinational research activities established abroad, especially from the US, would be low. Empirical work by Dunning and Young et al. confirm that little more than 10% of funding allocated by

[98] Robinson, 1988, p124

private industry in the US for R & D is transferred abroad.[99] While there are strong motivations for centralising the research facility there are sometimes equally strong external stimuli for decentralisation. Governments hoping to maximise the benefits of multinational investment, through the transfer of technology, may require that a certain minimum proportion of sales revenue be devoted to local research. Some of the research departments established in the NIC's were formed directly as a result of this type of pressure.

Through the provision of incentives governments can also influence the location of R & D departments. Many countries, especially those where high technology firms have invested offer various incentives to encourage firms to perform research locally. Among these are the provision of tax incentives or direct financial assistance.

Where frequent product modification/adaptation for a product is the norm it may be necessary for some firms to establish some local service department. In the electronics industries the expectation is that firms would establish some form of support laboratory in the host country while pure research would be located nearer to home. These R & D activities would tend to focus on development rather than on new products and processes.

[99] Dunning, 1981, p367-368; Hood & Young, 1979, p75-76

Stobaugh et al. also note that these R & D units are formed merely to act as technical service laboratories to help in the efficient transfer of technology.[100]

Those US multinationals which established in the UK seem to fit this expectation since they devote much of their research resources to adapting existing knowledge to meet the end market in contrast to performing the much higher skills intensive basic research.[101]

Although there are exceptions basic and applied research activities are concentrated in the home countries. There are several implications of low R & D efforts in host countries. The product development/modification function generally requires much lower skilled level employees than those required for primary or applied research. A direct consequence of this is that the prospects of new firm creation via technology spin-offs is minimal. As discussed in Chapter eight the low levels of primary research conducted abroad by multinationals is partly responsible for the low levels of entrepreneurial start-ups in the Irish electronics industry.

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[100] Stobaugh & Wells, 1984, p16
[101] Dunning, 1981, p208

3.10 Linkage Formation and the Multinational Enterprise

Host governments who adopt economic policies for the attraction of overseas investment perceive returns to occur through both direct and indirect sources. Direct returns accrue through employment creation, one of the latter originating from secondary sourcing; commonly termed linkage formation. Critics of the multinational often allege that when these firms invest they source considerable lower proportions of their inputs locally than indigenous firms operating in similar sectors.[102]

The levels of local sourcing appear to vary not only by industry but also by motivation for investment. It has been commented that it is in industries in which international production has grown the fastest, electronics for example, that intra-group transactions are the most likely with centralised control over purchasing occurring.[103] Empirical work by Caves also suggests that where multinationals establish labour intensive export platforms, a characteristic of overseas investment in the electronics industry in Ireland, they are unlikely to source any significant proportions of their inputs locally.[104]

Like the positioning of R & D departments in the home country the centralisation of purchasing departments is related to certain aspects of multinational behaviour. Dicken comments that a dominant strategy of

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[102] Dunning, 1981, p313-314; Caves, 1982, p271
[103] Dunning, 1981, p413
[104] Caves, 1982, p271

multinational electronics firms, particularly from the US, is the desire to increase their degree of vertical integration. These firms can be classified into three broad types;[105]

Vertically integrated captive producers Consists of companies which manufacture components entirely for usage within the company. IBM and Western Electric are the most notable examples of such firms. They use 100% of the chips manufactured on the internal market.

Merchant producers They are firms which manufacture semiconductors almost entirely for usage on the external market. Texas instruments, for example, sell 91% of their produce on the external market.

Vertically integrated captive-merchant producers These are firms which sell semiconductors partly on the internal and external market.

Studies reveal that US firms fit particularly into category one; with some also represented in the second category. Japanese and European firms are generally represented by the third category. This characteristic of the industry leads to the expectation that electronics firms in Ireland will show relatively low external purchases since the industry, in particular data processing, is predominantly US owned.

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[105] Dicken, 1986, p336-338

Several advantages from this centralisation of purchasing departments are readily identifiable. One of these is directly attributable to the geographical diversification of electronics plant locations. Through the network of affiliates operating in different countries these firms have the capacity to source goods from the lowest cost location. Centralised purchasing also allows them to purchase inputs from one particular location, thus gaining advantages from economies of scale and uniformity of quality.

As previously discussed this internal market also gives multinationals the ability to distort transfer prices; most notably for tax avoidance. O'Hagon for example comments that the current taxation policy in Ireland "...undoubtedly helps to explain the low levels of backward linkages in production, as importing from own company branches abroad is essential to maximising the benefits of transfer pricing."[106]

These factors all lead to the expectation that there is limited capacity for the development of an indigenous sub-supply industry. An examination of the Scottish electronics industry would seem to confirm this view point. Young et al. comment that the overseas electronics industry "...is poorly integrated, with little secondary employment creation".[107] Furthermore it was calculated that only fifteen per cent of production inputs were sourced locally.

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[106] O'Hagon, 1987, p399
[107] Young, Hood & Hamill, 1988, p144

The likelihood of multinational electronics firms sourcing to any significant degree in Ireland would therefore appear to be minimal. Even if these firms were to actively engage in a policy of purchasing from indigenous firms there exists a variety of external constraints which may prohibit them doing so. The relatively low technological capacity of indigenous Irish industry is one such reason. Telesis, for example, has commented that problems such as poor quality, high costs of local suppliers and poor delivery records often cause multinationals not to buy sub-components locally. Furthermore for these high technology products purchasers often require engineering design support and backup.[108] Frequently indigenous suppliers lack this experience and realistically cannot hope to obtain such markets.

The small size of indigenous electronics firms also acts as a hindrance to obtaining markets. Studies of international sourcing have indicated that a common practice of multinationals is that they will not source any more than twenty per cent of their purchases from any one supplier.[109] To capture this market smaller suppliers must be able to diversify both their product range and customer base. These factors plus the very short product life cycles within the industry, the shortage of working capital and consequently the inability to attract suitably qualified personnel all culminate in smaller firms having very limited access to the multinational market.

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[108] Telesis, 1982, p128-132
[109] SDC No.10, 1985, p10

3.11 Conclusions

This chapter identified the various issues pertaining to the possible abuse of transfer pricing by multinational firms. Transfer pricing was described as an accountancy practice for placing a value on (in)tangible assets which are transferred internally within a firm. Through the difficulties in placing a value on these assets firms effectively have the capacity to manipulate corporate funds. Distorting transfer prices gives multinationals many advantages. For instance it enables them to repatriate profits even if government restrictions are in force, avoid high import tariffs or reduce total tax liabilities.

However, the scope for manipulation of these prices is not unlimited. Tax authorities and customs officials have various safeguards in place to prevent such revenue losses. Various internal pressures exist which also may reduce the capacity of the firm to distort transfer prices. These factors have prompted some economists to regard the existence of the manipulation of transfer prices with scepticism. Nevertheless there is some evidence to support that it does exist, particularly in high technology industries.

The latter part of the chapter described the principal ways in which technology may be transferred via the multinational enterprise. The most common ways in which it may be transferred is through licensing, the positioning of R & D centres in the host country or the creation of industrial linkages with indigenous firms. Discussions suggested that in the

electronics industry it is unlikely that multinationals will engage in licensing agreements. A variety of factors, ranging from problems in appropriating adequate returns from research to the establishment of a potential competitor in a third country, were identified as ranking the most important.

Given that a considerable proportion of firms that have invested in Ireland are of US origin it is also expected that the degree of technology transfer through the formation of local research centres will be limited. As in the situation for licensing this is because of an array of internal and external constraints. The need for policing for potential divergence away from central product policies to the prevention of information leakages were considered particularly important. There is the expectation that when research facilities are transferred abroad they will conduct much lower skills intensive product development/adaptation only.

Multinational behaviour also suggests that there is very limited scope for the development of an indigenous sub-supply electronics sector. This arises primarily because multinational electronics firms in general strive towards high degrees of vertical integration. The internal market structure would therefore supply local affiliates requirement. The creation of this market also has been cited as providing the additional advantage of allowing the manipulation of transfer prices. Even where multinationals are willing to source locally questions may be raised over the capacity of indigenous firms to supply them.

CHAPTER FOUR

FOREIGN INVESTMENT & THE IMPLICATIONS OF THE SINGLE EUROPEAN MARKET

4.1 Introduction

This chapter is divided into two parts. The first details the trends of overseas investment in Ireland while the second details the expected effects of the Single European Market (SEM) both on present and future investment in the electronics industry. Emphasis is placed on this type of investment because, as chapter five indicates, a substantial proportion of those employed work for overseas firms.

Section 4.2 uses the eclectic paradigm to describe the path of overseas investment in the electronics industry. Subsequent sections, as far as 4.6, discuss the various changes in government policy which have resulted in the increase in overseas investment in Ireland from the early 1950's. Also identified is the different initiatives and various incentives and grant packages adopted by government to attract this investment. The final section highlights and discusses the primary motivations for overseas investment, particularly from the US, in the electronics industry.

The second part of the chapter is divided into five subsections, all related to issues surrounding the single market. It is comprised of a discussion of the origins of the single market and the reasons for its inception, the principal proposed changes in legislation which will result in its formation and an evaluation of the potential gains associated with it. The final two sections discuss the impact of the SEM on present investments in the electronics industry and its impact on future investments.

4.2 The Eclectic Paradigm

Through the eclectic paradigm Chapter two explains the theory of foreign investment. According to the theory a firm may engage in overseas investment if it three types of advantage exist; those of ownership, internalisation and location specific advantages. Using the paradigm the motivating factors for investment in the electronics industry in Ireland, particularly from the US, may be determined.

Ownership specific advantages can be described as those advantages which are internal to the firm. These advantages arise from the multinationality of the firm and those which branch plants may enjoy over 'de nova' enterprises. Such advantages enable a firm that invests abroad to out-compete indigenous rivals. Considering the EC as one large market these advantages explain how American owned firms can outcompete other European firms. They do not explain why firms once again mostly those from the US, invest in Ireland.

Chapter five shows that investment in Ireland is not directed towards supplying the Irish market but rather towards using Ireland as an export platform for supplying the EC market. The concept of OSA used by multinationals to outcompete indigenous rivals in the Irish electronics industry is clearly not the case.

Since ownership specific advantages alone do not adequately explain overseas investment in Ireland attention may be switched to those of the two remaining advantages described by the paradigm; internalisation and locational. It is by combining these sources of advantages that investment in Ireland may be explained. The incentive of a firm to internalise a market has been described as a response to avoid the disadvantages of distortions or disequilibrium in external mechanism of resource allocation.

With the creation of this internal market multinationals may avoid market imperfections when they are the weaker party and take advantage of them when they are stronger. One such source of market imperfection is the government created variation in tax rates or the existence of tariffs or trade restrictions between different countries. Through tariff and quota restrictions the EC effectively acts as a protected market so that an outside country wishing to exploit the European market can only do so either by licensing or establishing subsidiaries within the protective barriers.

As chapter three indicated it is highly unlikely that firms operating in the research intensive electronics industry will engage in licensing. Several reasons exist for this; the protection of proprietary know-how or the difficulties associated with cost evaluation being the most common. The remaining alternative is that of direct investment abroad. By subsidiary formation the multinational effectively creates an internal market. Through internalisation of OSA multinationals, particularly those from the US, have

been able to outcompete EC electronics firms. Since these electronics firms which have established in Ireland generally do not rely completely on the Irish market the question remains as to why multinationals have invested here rather than in other EC countries.

Those factors which influence the choice of location of a multinational firm are described as location specific advantages. Chapter two indicated that the most important of these included the size and nature of the market, the policies and attitudes of host governments, differences in social and cultural backgrounds of both home and host country and finally labour considerations.

4.3 Origin of Current Industrial Policy

Ireland's locational attractiveness originates from two sources. Its membership of the EC, providing tariff free access to the community, is one. The second is the diverse array of state incentives packages. The origin such policies to attract overseas investment is traceable to the 1955 White Paper, "Programme for Economic Expansion".

The establishment of new export orientated overseas investment was seen as a key to the future of Irish industry. Following the poor post-war industrial growth performance it was thought that for the economy to deliver the most immediate returns it would be necessary to concentrate on attracting export orientated overseas investment. This was to be achieved using generous tax benefits and heavy subsidies.

Lee comments that this was a dramatic reversal of previous government strategy. The content of the White Paper signalled a "...shift from protection towards free trade and from discouragement to encouragement of foreign investment in Ireland, involved a dramatic reversal of rhetoric, and to a large extent of practice of all policy, but especially Fianna Fail policy, since 1932".[110]

[110] Lee, 1989, p344

The reason for this change in policy was the previous virtual stagnation and future projected decline of traditional industry under protection; "The central idea behind the use of this strategy in the Irish context was the promotion of the exporting component or the manufacturing sector, since the import-substituting component, which had expanded considerably during the early years at tariff protection, had become stagnant and increasingly inefficient during the post war period".[111]

The relaxation and repeal of the Control of Manufacturers Act, which prohibited overseas ownership of Irish industry, marked a significant change in policy and was supported by all political groupings at the time.

William Norton, Labour Party T.D. commented that the act had "...lost its early significance, that there is a change in the whole industrial and economic situation and in contemplation of these circumstance the Act should be modified, if not in fact abolished altogether".[112]

Following the amendment in 1955 and the abolition in 1964 of this act foreign investment increased substantially in Ireland. These amendments are regarded as a milestone in government economic policy and alone can be used to trace the beginnings of new outward looking overseas investment in Ireland. Not alone did government encourage overseas investment but it

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[111] O'Hagan, 1987, p385
[112] O'Malley, 1989, p79

provided an increasingly diverse array of tax concessions and grants to investing firms. Such policies have consistently been maintained to the present.

This new industrial policy began with the establishment in 1949, and legally enacted in 1950, of the Industrial Development Authority. Among the functions of the IDA was the initiation of proposals for the attraction of new overseas investment to Ireland. It was not until 1969, following the merging of the IDA and An Foras Tionscail, that the IDA was given the responsibility for the distribution of grants and the complete function of attracting overseas investment.

The attraction of overseas investment to Ireland was made possible by what is often termed the best incentives package on offer in Europe.[113] These incentives may be subdivided into two groupings, Financial and Fiscal. The former consists of non repayable cash grants, labour grants and so on while the latter consists of allowances and reduction in lieu of income tax.

The present system of grant payments and incentives packages have evolved and have been increasingly diversified over the past four decades. In chronological order the changing format of these incentives packages and key government acts may be listed as follows;

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[113] Telesis, 1982, p195

1949: IDA established.

1952: Establishment of An Foras Tionscail by the Underdeveloped Areas Act to administer a scheme of non-repayable cash grants for the development of designated areas in the West of Ireland.

1956: Industrial Grants Act, grants extended to the whole country. IDA empowered to give grants towards the cost of industrial buildings and land in non-designated areas.

1956: Finance Act, 50% tax remission on profits earned on increases in export sales over the 1956 level.

1958: Proportion of tax remission increased to 100%. Easing of Control and Manufacturing Acts.

1959: Industrial Grants Act. IDA grant giving function transferred to An Foras Tionscail. Maximum rate of 50% of Plant and Machinery cost and 100% of Buildings and Land cost in Designated Areas. Elsewhere grants available at the rate of 1/3 of Plant and Machinery costs and 2/3 of Building and Land costs, where grant must not exceed £250,000.

1960: 100% tax remission on profits from increased exports raised from 10 to 15 years and diminishing concessions for a further five years.

1963: Underdeveloped Areas (Amendment) Act, Distinction between designated/non-designated areas abolished for grants in excess of £250,000.

1964: Complete repeal of Control of Manufacturers Act so that by 1968 there would be no restriction on ownership or profit repatriation.

1966: Industrial Grants (Amendment) Act, An Foras Tionscail empowered to administer industrial estates complete with advanced factories.

1967: Free depreciation for Plant and Machinery in depressed regions with 50% initial allowances in other areas.

1969: Industrial Development Act, merger of An Foras Tionscail and the IDA. Designated areas granted up to 40% capital costs. Non-Designated areas granted up to 25% capital costs with a further 20% extra at IDA discretion.

35% re-equipment costs for designated areas and 25% re-equipment costs for non-designated areas. Grants towards leased assets; Subsidisation of interest rates; Guaranteeing of loans; Grants towards R & D (up to 50% or £15,000).

1969: Export Profits Tax Relief (EPTR) was originally intended to terminate in 1979/80 but was extended to 1989/90 in the 1969 act.

1978: R & D grants increased to a maximum of £50,000 per project, (this has subsequently been raised to £250,000), Research park established in Naas. EPTR abolished and replaced by 10% Corporation Tax on manufacturing industry for the period 1981-2000.

1983: National Linkage Programme established to encourage firms, especially those which are overseas owned, to source locally in Ireland.

1984: Technology acquisition grants introduced, up to 50% of costs, towards obtaining new product or process technology from abroad.

1988: 10% Corporation tax extended to 2010.

Since the ending of the protectionist era the degree and scale of grants available has substantially increased. These grants, combined with the entry to the EC and membership of the EMS, have resulted in Ireland being among one the most favourable locations for certain forms of investment in Europe. Comparing the types of grants on offer in Northern Ireland, Scotland and Spain (two of Ireland's principal competitive rivals for US electronics investment) the Telesis report concluded that, though crudely done, "...comparisons show that Ireland on average provides a substantially higher incentive packages than other countries for attracting foreign firms".[114]

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[114] Telesis, 1982, p195

4.4 Changes in Grant Policies

Apart from the removal of the EPTR, primarily as a result of EC pressure, and the introduction of the new 10% Corporation tax there was not a major review of government policy towards the provision of grants until the Telesis report of 1982. Up to this point variations/modifications in the level of grants offered did occur but did so without major policy review.

The governments response to Telesis was the White Paper "Review of Industrial Policy" which was published in 1984. No significant changes of industrial policy was outlined. However, the re-equipment grant scheme was replaced by Technology Acquisition grant aid. This was to provide export and import substituting firms grants "...towards the costs of acquiring new product or process technology from abroad".[115]

It is unlikely that the scale of investment from primarily export orientated firms, a characteristic of electronics establishments, would have been adversely affected since this grant was similar in nature to the re-equipment grant. Indeed it had a higher grant maximum of 50% compared with the previous 35% for the re-equipment grant.

Through these grants it was hoped to upgrade the technological capacity of Irish industry although as later discussions show this has had limited effect

[115] White Paper, 1984, p41

on the electronics sector. Other changes, though by no means substantial, were suggested. There was general agreement that "...too high a proportion of the State spend has gone towards investment in equipment and fixed assets and that the balance needed to be shifted more towards softer assets, for example, grants towards recruitment, and areas of perceived weakness, for example marketing, technology and management developments...".[116] This change in policy occurred partly as a response to the centralisation in the home country of key business functions of overseas firms.

Changing patterns of state aid may be seen by considering that in 1978 it was estimated that just two per cent of state aid was devoted to marketing and research & development, subsequently rising to four and five per cent respectively in 1983. Training grants accounted for seven and thirteen per cent in these two years respectively. Fixed assets accounted for the most significant expenditure with eighty nine per cent of total spent on it in 1978 and seventy eight per cent in 1983.[117]

As a result of the changing patterns of state aid investment in fixed assets declined significantly to 52.9% by 1989. Investment in the advanced factory programme was particularly curtailed primarily as a result of the high cost and low occupancy rate of completed units. In this year the targets set by the White Paper had been reached, with expenditure on marketing having

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[116] Dept. of Industry & Commerce, 1990, Section 4.7
[117] White Paper, 1984, p42

increased to 11.4% of state total and investment in science & technology (S & T) increasing to 16.8%.[118]

Through the increased concentration of state aid especially on S & T acquisition it was hoped that overseas firms would locate their more skills intensive departments in Ireland, thereby increasing the likelihood of indigenous spin-off firm formation. This policy is particularly applicable to the higher technology industries such as electronics. It was also hoped that indigenous firms would be able to purchase technology from abroad, although this is expected to have limited effect for those firms operating in the electronics industry.

[118] Dept. of Industry & Commerce, 1990, Section 4.10

4.5 Overseas Investment in the Electronics Industry

Overseas investment in Ireland has been compared with export orientated investment in the Less Developing Countries (LDC's) in the 1960's and 1970's. Two types of investment occurred in these countries. The first was in technologically mature industries, such as Clothing & Footwear while the other was in more technology intensive industries such as electronics. The dominant attraction in each of these industries, in the LDC's, is low labour costs.

Like the developing countries Ireland's relatively low labour costs has provided a fundamental incentive in attracting investment in the electronics industry. Low labour costs, however, are just one of the many factors influencing the investment decision and as such do not explain completely investment in Ireland. Distance to markets, special concessions and political stability have also been identified.[119] Opinions vary as to the most influential incentives for attracting investment in the electronics industry.

O'Hagan comments that Ireland availed of new export orientated investment because of "...the movement towards free trade, the introduction of tax incentives and capital grants and the removal of various restrictions on DFI...".[120] The findings of the Telesis report confirms this viewpoint. According to the report "...over 80% of the companies visited during our

[119] Helleinar, March 1973, p21-47
[120] O'Hagan, 1987, p269

study came to Ireland primarily because it provides a tax shelter for penetrating the EEC... A company with a European Community market can reduce its taxes, avoid EEC tariffs, and even gain access to investment grants of financing assistance by establishing a plant in Ireland. This is why most foreign companies have come".[121] Overseas investment would therefore appear to be arise because of an array rather than any singular factor.

The very low rate of corporation taxation, political stability, proximity to the European market and effective promotion work by the IDA all culminate to entice overseas investment.[122]

Many different forms of attraction have been used by the IDA in enticing overseas investment in the electronics industry. Much of the listed advantages are comparisons with countries, such as the UK, which are perceived to be competitors for investment. Among those listed are;[123]

- Ireland has the youngest population in Europe, 53% are under 28 years of age.
- 78% of 16 year olds are in full time education, the comparable figure for the UK is 54%.
- 60% of 18 year olds participate in educational training. This compares with 35% in the UK.

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[121] Telesis, 1982, p135
[122] Drudy, 1984, p135
[123] IDA, 1991, Section 2

- Almost 40% of Ireland's second level students go on to third level compared with 15% in the UK.
- Ireland has among the lowest labour costs in Europe, roughly $11.20 per/hour compared with $13.06, $21.51 and $21.70 in the UK, Germany and Sweden respectively.
- The proximity to all major European cities.
- An excellent telecommunications system achieved through a digital exchange network.
- A lower inflation rate than France, the UK., West Germany, Italy and the US.
- Since 1988 lower bank interest rates than the UK.
- National pay agreements.
- A higher percentage rate of return on US manufacturing investment in Ireland than in the EC.
- Comprehensive state incentives packages.

The IDA has been keen to promote the availability of a young, well educated and large supply of relatively cheap labour. The availability of this type of labour is very necessary for the assembly type manual manufacturing operations which US firms conduct in Ireland.

Much of these operations are characterised as having a high import/export dependence on their affiliates. This may also provide an indirect incentive to attracting overseas investment. Since the 10% rate of corporation tax is

much lower than in any EC country multinationals have the incentive to concentrate profits in Ireland and reduce their total tax liabilities. Work by O'Honoughan, Foley, the ESRI and others would seem to confirm that to some extent profit switching transfer pricing does exist in certain industrial sectors. (See Chapter six)

O'Hagan comments that, in the 1970's, because of the possibility for engaging in transfer pricing " ...it (ESR) probably explains why, according to the IDA, ESR probably outweighed all other incentives, including cash grants, in encouraging new foreign industry to locate in Ireland...".[124]

Since the electronics industry is very much overseas controlled and has a very high import/export dependence on affiliates these arguments may be extended to it. If profit switching transfer pricing occurs in the electronics industry, and indeed later discussions would seem to lead to the expectation that in certain sectors that it probably does, then this is another distinct advantage for investment in Ireland.

Even ignoring the existence of transfer pricing it could be hypothesised that multinational electronics investment has generally occurred in Ireland particularly because of the generous tax incentives offered. Indeed Telesis notes that electronics companies have invested in Ireland for the dual

[124] O'Hagan, 1987, p393

purpose of tax concessions and for access to the European market.[125] The importance of tax incentives is further enhanced if one considers that a number of companies, again interviewed by the Telesis consultancy group, said that they would have invested even if no other incentives existed apart from those related to tax concessions. It is unclear, however, how many of these were electronics.

It is worth noting that even though EPTR, which played a fundamental part in attracting overseas investment, was replaced by the 10% corporation tax it has not seriously adversely affected overseas investment in Ireland to any significant degree. This is because the 10% tax rate can effectively be reduced to zero through depreciation and other allowances.

In summary investment in the Irish electronics industry can be described as occurring as a result of a combination of factors, most notably tax concessions, the supply of manual labour and proximity to the European market.

The following section focuses on the expected effects of European market unification on both present and future investments in the electronics industry. Also discussed are changes, technological or otherwise, related to the electronics industry which again may affect present and future investments.

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[125] Telesis, 1982, p142

4.6 Background to the Single Market

The creation of a Single European Market (SEM), an area without any form of trade barrier, is an ideological concept which is not altogether new. Its origins lie in the Treaty of Rome, signed in 1958 by Belgium, France, Germany, Luxembourg, The Netherlands and Italy. The treaty created the European Economic Community (now commonly termed the Economic Community or EC) which proposed to "...lay the foundations of an ever closer union among the peoples of Europe".[126]

It was envisaged that this community would be able to take full advantage of the free movement of goods, capital and persons while each member state would also have common agricultural and fiscal policies. Through these mechanisms each member state would have the capacity to sell its products in a considerably larger, more economically open market. To enhance the free movement of goods tariffs and trade quotas were removed and in 1973 the market was extended to include Denmark, the UK and Ireland.

In the decade following 1973 the community was financially considerably different to the decade and a half previous. In the late 1970's severe recession and high inflation was not uncommon. Europe suffered from the after shocks of the earlier oil price crises. The highest recorded

[126] NESC, 1988, p3

unemployment rates followed. Meanwhile, and probably directly related to recession and high inflation, the adopted goals of a single market were not being achieved.

Governments either purposely neglected free trade and capital movements, to protect their own native industries, or were more involved in the economic crises in their own countries to enable the creation of political and economic union. NESC noted that "...not only was agreement not forth-coming on further progress of economic integration, but the community became embroiled in continual and deep disputes on budgetary contribution and agricultural policies".[127] The combination of recession and 'unCommon' EC policies have been responsible for some of the diminution of the community as an economic force.

This decline may clearly be seen if one compares the market shares of the three competitive rivals, the US, Japan and the EC. Over the period 1979 to 1985 the EC lost 1.4 percentage points of market shares on external manufacturing markets compared with increases of 0.7% for the US and 5.4% for Japan.[128] Most significantly the EC has continually lost its percentage share of the most high technology industries, electronics and information technology for example, to both the US and Japan. It has been estimated that the community has a technology deficit of $10.6 billion with

[127] NESC, 1988, p4
[128] Emerson, 1989, p16

its Japanese and US competitors.[129] This is one of the most fundamental reasons why EC governments have abandoned their 'unCommon' market policies and have sought to change previous initiatives through the Single Market.

Economic pressure within the EC resulted in studies undertaken to access the viability of a single market. Various studies were conducted, most notably by Emerson, Cecchini and Albert & Ball. The common underlying trend of each of these reports was that they all considered the costs associated with what is termed 'non-Europe' as primarily responsible for the poor economic performance of the community and its inability to withstand recession over the latter part of the 1970's and 1980's.

It would appear that by some economic indicators that the community is at least as strong as either the US or Japan. For example its GDP is only slightly lower than the US, at 3,669 billion ECU compared to 3,869 billion ECU for the latter, and is higher than Japan's by over 1.5 billion ECU. The fragmented nature of the European market, however, results in the total GDP of EC member countries as being meaningless. It is this fragmentation that the single market seeks to rectify.

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[129] Dudley, 1989, p26

The existence of non-tariff barriers, or NTB's, are responsible for this fragmentation of the community. NTB's originate from a variety of sources with the most directly applicable to manufacturing industry being:

- physical barriers, such as customs checks and so on
- the non-harmonisation of technical standards
- variations in fiscal policies
- government procurement policies

It is expected that through the harmonisation of these barriers the direct and indirect effects of their removal will at least enable EC firms to be as competitive as firms particularly those from either the US or Japan. By creating a SEM it is envisaged that markets will become more free and competitive. Its creation will allow "...access to an enlarged market which would enable firms to achieve economies of scale and scope and hence increase their productivity whilst at the same time confrontation with producers from other countries would increase competition, drive prices down and favour innovation".[130]

Foley similarly comments that with the removal of barriers to trade it would "...create a growing market that would direct labour, capital and material to sectors of greatest economic advantage and promote competitive activity

[130] Coffey, 1988, p134

and innovation".[131] The reduction in costs associated with the removal of each of the barriers, combined with their indirect removal effects, will have the obvious effect of increasing the attraction of the EC for foreign investment. The progression of the community as a location which is more receptive for this form of investment primarily occurs through the potentially greater returns on investment because of the liberalisation of a market exceeding 300 million people. The effects of the creation of the SEM on overseas investment in Ireland will be discussed following a description of the expected changes which will occur after 1992.

[131] Foley, 1990, p4

4.7 The Single Market

In 1985 the European Commission published a White Paper entitled 'Completing the Internal Market', which detailed three hundred proposals to be instituted to create the single market. It sought to "...identify all the existing physical, technical and fiscal barriers which justify the continuing existence of frontier controls and which prevent the free functioning of the market".[132]

By 1987 all the draft proposals identified in the White Paper, reduced to two hundred and seventy nine, were to be enforced by the end of 1992. Unlike previous initiatives that have been adopted by member countries it most importantly provided a legal framework and a political impetus for the creation of a single market.[133]

It is envisaged that the internal market will "...comprise an area without internal frontiers in which the free movement of goods, services and capital is ensured".[134] The realisation of this goal, however, may only be achieved by the complete removal of the previously mentioned non-tariff barriers. The capacity to abolish these NTB's, and subsequently the expected gains from the SEM, is open to much debate.

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[132] Office for Official Publications of the EC, 1987, p20
[133] Dudley, 1989, p28
[134] McKenzie, 1991, p1

While arguments remain as to the direct gains associated with market unification most political and economic figures agree that the removal of NTB's will have significant impact on European industry. The question remains as to the effects of their removal on the European electronics industries and overseas investment in these industries in Ireland. This will be discussed following an analysis of the most important of the proposed changes in barriers affecting European trade.

The most important of the trade liberalisation policies to manufacturing industry, as noted in section 4.6, are:

(a) The removal of physical barriers

(b) The harmonisation of technical and fiscal barriers

(c) The liberalisation of public procurement policies

4.7.1 Physical Barriers

Physical barriers are the most visible of all NTB's. They are barriers to intra-Community trade which occur because of customs or any other forms of delay at borders. These procedures are related to government necessity for knowledge on the nature of goods imported, their type, value and so on. They are also required because of the existence of trade quotas and VAT and excise duty variations between member states. Other important reasons are for adherence to health, security, transport regulations or formalities carried out for statistical purposes.

There are four principal types of costs associated with customs procedures. They are borne by both manufacturers, governments and ultimately the customer. They can be summarised as follows :[135]

- The cost of administration staff for the importing or exporting firm to deal with paperwork and other associated overheads.
- Costs for the importing/exporting firm associated with customs clearance, that is customs agents or advisory bodies.
- The costs associated with transport equipment or goods delayed at customs clearance.
- The maintenance costs of customs procedures on public authorities.

It would appear that, since the effective cost of exporting would be reduced, the removal of such barriers would have a significant positive effect on those firms which concentrate on export markets. Their removal would also have the effects of increasing the country specific advantages of the more peripheral areas of the community through firms having easier access to mainland markets. Indirect effects may either be the rationalisation of European multinationals or the relocation of subsidiaries away from the primary market location and back to the home country.

Importers perceive that following the removal of physical barriers importers perceive that trade volumes would increase by 1.0%, exporters expecting

[135] Emerson, 1989, p33-36

an increase of 3.2%. Total direct gains are an expected five to twelve billion ECU's.[136] It should of course be noted that the effects of the removal of physical barriers vary according to both industry and country and will be discussed in subsequent sections.

4.7.2 Technical Barriers

Though not physically visible technical barriers, a result of the non-harmonisation of EC technical regulations, are rated as the most significant cost increasing barrier to trade. It is estimated that there are over 100,000 different technical regulations within the community, making both their removal and evaluation an extremely complex issue. Their importance may be seen if one considers that completion of the internal market cannot be achieved without their removal. The European Commission comments that it would "...be nonsense to abolish the obstacles found at present at frontiers and simply continue with the obstacles within the Member States".[137]

Not alone do technical barriers affect the closer integration of Europe, but they also hinder the competitive infrastructure of high-technology industry. Market fragmentation places European industry, especially in the electronics and Information Technology sectors, at a severe competitive disadvantage to US and Japanese subsidiaries.

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[136] Emerson, 1989, p39; Cecchini, 1988, p14
[137] Office for Official Publications of the EC, 1987, p37

These regulations exist for a variety of reasons; the protection of consumers, for health & safety or for environmental reasons. They have even been used by various member countries as a form of protection for their national products, the case of 'Cassis de Dijon' being a notable example.

Costs for companies arise from several sources:

- The duplication costs of research and development: As a whole the European Community spends as much on research as Japan. Because the research has been fragmented it means that a considerable amount of it is unnecessarily duplicated and effectively the wheel has been invented several times over.

This has consistently reduced the competitive standing of the EC in several industries, most notably in the higher technologies, with respect to both the US and Japan. Even when a product has been successfully researched and manufactured it often has to be further subjected to modifications so that it can be sold in different national markets.

- Shorter production runs increase costs since adaptations have to be made to the product so that it may be sold in different markets. It has been estimated that if EC firms operating in the electronics and microcomputer components industries can avail of larger markets and double their

production runs unit costs will fall by typically 30%.[138]

- Increased costs associated with inventory and product distribution.

- Manufacturers who have developed products for sale on the home market but who may also have the capacity to sell the same product, provided it is suitably adapted in the community, are faced with two options. They may bear the extra costs, previously mentioned, or will restrict themselves to supplying the local market. By restricting themselves to this market firms could find themselves in the longer term suffering from competitive weaknesses on the world market. It may be argued therefore that because some firms do not exploit non-national markets, due to the costs associated with technical barriers, their capacity to compete in future markets is severely affected.

Not only are costs incurred by companies but they also affect public authorities through costs for product testing and so on. Consumers ultimately suffer through the increase in costs because of the product modifications. These costs have much the same effect as customs and distribution costs in that they impose competitive disadvantages on exported products.[139]

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[138] Office for Official Publications of the EC, 1987, p56
[139] Davis, 1989, p18

Variations in technical standards have impacted on the Irish computer industry. Computer products exported by among others, Prime (now closed) and Digital to Germany have had to comply specifically with German safety regulations before they could be sold. Significant costs had to be devoted to obtaining German approval. Several modifications had to be made to products thus increasing costs associated with resources devoted to research and time delays from product testing and development.[140]

4.7.3 Fiscal Barriers

The removal of fiscal barriers are extremely important for the completion of internal market. Without their removal the elimination of physical barriers is impossible. Physical and fiscal barriers can be regarded as one of the same thing. The NIEC comment that the "...removal of both fiscal and physical barriers to trade are inextricably bound up together since fiscal checks feature prominently among the functions carried out at the Community's internal frontiers. In fact, fiscal checks are one of the underlying reasons for the existence of physical frontiers".[141]

To remove physical frontiers, therefore, one has firstly to remove the primary causes of their existence, that is the non-harmonisation of excise and VAT rates. The gains associated with the removal of fiscal frontiers are much the same as those from the removal of physical barriers, that is the

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[140] Foley, 1990, p176
[141] NIEC & NESC, 1988, Section 6.1

cost saving associated with the elimination of both customs checks and administration expenses. Their removal, however, is wrought with difficulty since each member state will suffer to a lesser or greater degree.

It is expected that out of the twelve member states Ireland, along with Denmark, would see a considerable loss in indirect taxation revenue.[142] Rather than hoping to achieve complete harmonisation of indirect taxation levels the Commission hopes to introduce a series of tax bands, adopted from the United States, as a solution to the problem. The US system operates by having the differences in indirect tax rates from state to state being sufficiently low to effectively make smuggling pointless.[143]

Significant direct cost reductions from the elimination of fiscal frontiers are considered to be negligible when compared to the indirect gains associated with the forced increased competitive behaviour of European industry. This increased competition is expected to force the manufacture of products at better quality and lower costs.

4.7.4 Public Procurement

Barriers to trade occur due to public procurement policies since government purchasing departments generally tend to purchase goods from national, that

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[142] Emerson, 1989, p62
[143] Office for Official Publications of the EC, 1987, p52

is domestic suppliers, rather than foreign firms. The result is that public authorities may pay more for supplies than would be the case if contracts were advertised across the Community.

It is estimated that in total community members pay 17.5 billion ECU more on public procurement purchases than necessary.[144] The protection of native industry, defense related reasons or the support of new indigenous developing technologies are the primary factors responsible for this. Different industries are affected by varying degrees since government contracts and regional price disparities deviate significantly by industry.

Of the electronics subsectors the telecommunications industry is the most severely affected. Alternatively the computer industry, characterised by European firms competing with IBM subsidiaries, suffers from no major price distortions across national boundaries primarily because of intense competition. It is therefore expected that no significant changes in prices will occur in the latter industry from changes in procurement policies.

[144] Cecchini, 1988, p17

4.8 Gains from the Creation of the Single Market

Expected gains from market integration, both direct and indirect, vary considerably by industry, as indeed do they by author. It has even been argued that no considerable gains at all will accrue though market unification. Some economists evaluate the direct gains from removing NTB's as being equal to their associated costs. Emerson, for example, comments that the "...economic impact of market barriers may be analysed in terms of the cost of their presence, or the benefit of their removal. However, there is no real difference, only a change of sign from minus to plus, between these two expressions".[145]

It is this rather simplistic approach which has caused some scepticism. Given the differences in nationalities, cultures and so on, combined with the difficulties in approximating technical standards, or indeed all of the NTB's, it would appear that direct economic gains will be less than expected.

Dudley, for example, writes that even with the implementation of half the White Paper proposals the associated returns will be significantly less than fifty percent.[146] The expected gains to occur through the formation of a single market can be deemed to occur over the longer rather than short term. Desai cautions that "...the economists 'longrun' can be very long and indeed does not refer to calender time at all..."[147] It is also argued that the

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[145] Emerson, 1989, p22
[146] Dudley, 1989, p35
[147] Desai, 1989, p13

Cecchini report overestimates the gains from the single market and neglects to comment on the squeezing of profits and expected company failures from market liberalisation.[148]

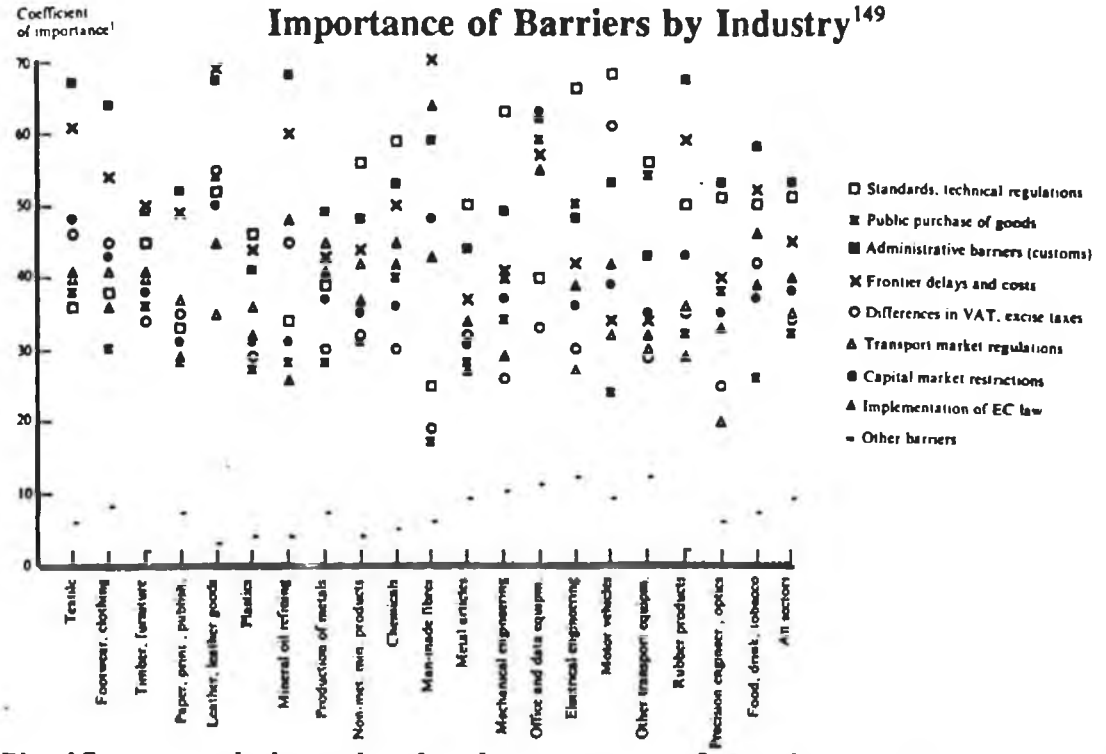
Therefore, the analogy whereby costs can be turned to direct gains may not hold. On such a complicated and politically sensitive issue of the single market it is likely that there will be varied responses to the perceived economic gains. It is not so unexpected, therefore, that different reports will highlight dissimilar gains/failings of market unification.

Nerb, in a survey covering 20,000 enterprises in the 12 member states, evaluated the perceptions of industrialists to barriers to trade in an attempt to determine projected gains from market unification. The importance of nine barriers to trade were evaluated by industry. Figure 4.8.1 below indicates the findings.

[148] Desai, 1989, p13

Figure 4.8.1

Importance of Barriers by Industry[149]



Significant variations in the importance of barriers was indicated by industry. For example, the electronics industry consisting of the data processing and subsectors of Electrical Engineering exhibited dissimilar results. In the former industry capital market restrictions and administrative barriers, due to customs procedures were ranked by firms as very important.

Public procurement, the costs associated with frontiers and transport market regulations were all considered important. The non-harmonisation of technical standards was considered only slightly important, probably due to standard operating systems. Differences in VAT and excise duties were only ranked as 'not so important'.

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[149] Emerson, 1989, p35

Alternatively the Electrical Engineering industry, whose subsectors are constituents of the electronics industry, regarded the non-harmonisation of technical standards as by the far the most important. Non-harmonisation of standards especially affects the telecommunications industry. This industry is also greatly affected by public procurement policies with industrialists ranking this important. It has been estimated, in the telecommunications industry alone, savings of 1.25-1.5 billion ECU could be achieved through the harmonisation of technical standards and liberalisation of public procurement policies.[150]

Customs barriers were ranked closely to public procurement while frontier delays, implementation of EC law and capital market restrictions ranked 'important'. Like data processing, differences in VAT rates were considered unimportant as was transport market regulations. These survey results do not, however, correspond to the perceptions of Irish managers of the importance of barriers in the electronics industry in Ireland.

The difference in the survey results probably occurs because of the different characteristics of Irish and European electronics firms. Irish electronics firms differ from their European counterparts since, as later chapters will show, a considerable proportion of those employed in the industry work for an overseas affiliate. These are characterised as having a high export propensity with a significant proportion exported to affiliated companies.

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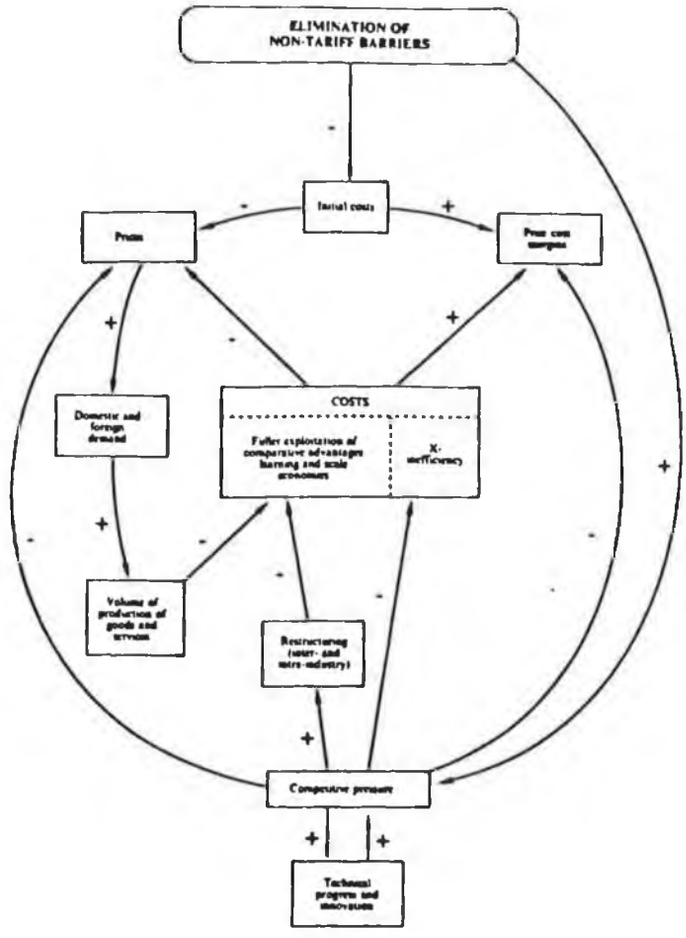
[150] Cecchini, 1988, p54

Quantisation of the effects of the removal of barriers is a very complex issue. The importance of barrier removal may be seen as both country and industry specific. The issue is further complicated by the generally agreed hypothesis that the indirect effects of barrier removal will be greater than their direct effects. It is these so called indirect effects, rationalisation of industry and so on, that will most likely affect future investment in the predominantly foreign owned Irish electronics industry.

The total economic gain for the twelve EC member states is estimated at over 200 billion ECU, with direct gains accounting for a very small proportion of this.[151] With the completion of the internal market a series of integration effects will occur and will promote efficiency and competitiveness in the community through two channels - increased market size and greater competition. A schematic representation of the perceived gains is shown in figure 4.8.2 below.

[151] Cecchini, 1988, p83-84

Figure 4.8.2[152]



The removal of NTB's and reduction of initial costs will cause the initiation of a train of interrelating mechanisms. Once initial costs are reduced, following the removal of barriers, there occurs corresponding price reductions, achieved through exploitation of economies of scale, rationalisation of industry, increased consumer demand and competitive pressure. Increased competitive pressure will also have a positive impact on technical progress and innovation. It is envisaged that these effects will increase the efficiency and competitiveness of firms operating in Europe.

[152] Emerson, 1989, p125

Using Figure 4.8.2 several stages of the potential gains from the formation of the internal market can be identified and evaluated through gains in economic welfare. This is just one mechanism for evaluating the gains from integration. Total economic gain is calculated through the amalgamation of gain for the consumer, via lower prices and eager purchases, and gains linked with the removal of operation inefficiencies of firms. These inefficiencies cause the price of goods sold in one country to be higher than in the country in which they were produced. Cecchini has estimated the gains from each stage.[153]

The first stage occurs through the removal of direct barriers to trade. Gains from their removal is an estimated eight to nine billion ECU. The second stage evaluates the costs associated with the limitation of the effects of competitive pressures because of protective public procurement policies and divergent technical standards. These all result in overpricing and excess costs and cause a hinderance to free competition. Gains here are expected to be 57-71 billion ECU.

The third stage examines the gains from firms able to exploit larger markets with longer production runs and the corresponding lower costs. Gains are also expected through the reorganisation of production units. Exploitation of economies of scale is expected to result in gains of 61 billion ECU.

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[153] Cecchini, 1988, p84

The final stage, yielding expected gains of 46 billion ECU, will occur through increased competitive pressure which will force costs down. This will have the effect of increasing consumer demand causing firms to reorganise inefficient management systems and ensuring an improvement in the quality and range of products.

The combined total calculated value of these economic gains is estimated for seven of the EC countries. They account for 88% of GDP of the twelve, and lies between 127 and 187 billion ECU. Extrapolating to the twelve EC countries gives total approximate gains of 174-258 billion ECU.

The removal of NTB's also increases competitive pressures which result in a positive impact on technical progress and innovation. This is regarded as one of the most important side effects of the Single Market. The drive to innovate will cause firms to invest more in R & D and produce more products, while market unification will increase sales, effectively the creation of a virtuous circle.

Several aspects of the expected closer integration of Europe are important to the Irish electronics industry. Two aspects of importance to be discussed are the effects of market integration on current investment in the electronics industry and secondly the effects on future investment.

4.9 The Single Market and the Irish Electronics Industry

To discuss the implications of market unification on the Irish electronics industry we need effectively to consider the effects of the SEM on overseas investment, particularly that which originates from the US. The reason for this is, as the following chapter indicates, is that over 80% of those employed in the electronics industry in Ireland work for an overseas firm. This figure is substantially higher in the manufacture of computers and active components.

By considering that those overseas firms which have invested in Ireland are predominantly export orientated then it could be hypothesised that the initial direct effects of barrier removal are expected to be positive. These firms are not protected by barriers but rather are hampered by them. Delays at borders, the non-harmonisation of technical standards and public procurement policies all add to the cost burden facing them.

Opening up of public procurement, for example, may have a very positive impact on the electronics industry in Ireland. It could cause enhanced markets since over 60% of the purchases in Information Technology, representing items from telecommunications to computer equipment, is accounted for by public procurement.[154] The corresponding figure for the data processing industry is 30%.[155] This projected growth market alone could

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[154] O'Donnell, June '89, p23
[155] O'Malley, 1990, p12

account for a substantial increase of the export potential of firms in Ireland. The direct effects of barrier removal should help increase the export capacity of overseas firms in Ireland.

Previous periods have shown export capacities to be strong. For example over the period 1985-1987 the ratio of exports to imports in the data processing industry is 643. The comparable figures for the telecommunications and television receivers sectors over the same period is 210 and 117 respectively.[156] It is likely therefore that these firms could take advantage of new export markets.

Though far from complete, and by now in some respects dated, figure 4.9.1 below provides a useful indication of the response of companies in the Data Processing, Electrical Engineering (of which Equipment for Telecommunications and Radio and Television receivers are electronics subsectors) and Instrument Engineering to the impact of 1992 on firms sales, investment and employment.

[156] O'Malley, 1990, p25

Figure 4.9.1[157]

Response of Companies in Office & Data Processing Machinery, Electrical Engineering and Instrument Engineering to "What Impact Do You Expect the Completion of the Internal Market by 1992 to have on the Following?" (% of Respondents)

	In 1989-1992				In 1993-1996			
	Increase	No Change	Decrease	Don't Know	Increase	No Change	Decrease	Don't Know
Your Sales:								
in Ireland	17.2	75.9	3.4	3.4	13.8	69.0	6.9	10.3
to other EC	75.9	24.1	0	0	75.9	17.2	6.9	0
Your Investment:								
in Ireland	65.5	35.5	0	0	55.2	31.0	3.4	10.3
in other EC	34.5	41.4	0	24.1	31.0	34.5	0	34.5
Your Firm's Employment:								
in Ireland	51.7	37.9	10.3	0	55.2	34.5	6.9	3.4
in other EC	24.1	41.4	3.4	31.0	24.1	37.9	3.4	34.5

Seventy six percent of the respondents indicated that they expected sales to the EC to increase over the periods 1989-1992 and 1993-1996. Twenty four percent expected no change over the former period, seventeen per cent for the period 1993-1996. Sixty five percent of respondents said that their firms would be increasing their investment in Ireland over the period 1989-1992 while fifty two per cent said that there would be an increase in the numbers employed.

The comparable figures for the 1993-1996 period is an expected increase in investment and employment by fifty five per cent of the respondents. Thirty five and thirty one per cent of respondents indicated that there would be no change in investments over the two periods. Finally, thirty eight and thirty four per cent of the respondents indicates no change in employment over the two periods.

[157] O'Malley, 1990, p22

Subsectors of the electronics industry, most notably data processing, would appear in terms of expected trends of investment, employment and ratio's of exports to imports to be competitively strong. It is therefore expected that foreign enterprises in Ireland would take full advantage of the new more open markets and expand operations in Ireland.

O'Malley, however, stresses that caution should be exercised about these conclusions. He comments that even "...a strong multinational enterprise with a very satisfactory operation in Ireland may not necessarily expand production in Ireland. Instead it may expand production in other satisfactory European establishments, or it might set up a new establishment elsewhere in the EC, perhaps with newer more advanced technology".[158] Such firms, generally characterised as labour intensive, may expand their operations to locations like either Spain or Portugal, due to low labour costs, or transfer from their present semi-peripheral to mainland areas of Europe.

An indirect effect of the single market, which may have significant implications for the Irish electronics industry, is its effects on competition. As previously discussed firms may be forced to reorganise their organisational structure, perhaps including rationalisation, to gain advantage from economies of scale, due to either an enlarged market or to face competition.

[158] O'Malley, 1990, p253

This induced rationalisation may cause electronics multinationals to invest directly where the market is located, and not establish export platforms in Ireland, or choose lower cost locations for the more labour intensive part of their operations. In the most pessimistic scenario the restructuring of industry may "... involve attempts to exploit agglomeration economies, or other sources of advantages, such that Irish plants would be discarded, and the strategic response of non-EC firms would involve location of production units linked with their R & D centres".[159] For a variety of reasons, primarily due to the motivation for investment in Ireland, multinationals have not established research facilities in general in Ireland.

If one is to assume that the previous comments hold true then it could be hypothesised that rationalisation may force firms to switch investment away from Ireland. Doyle describes a similar pessimistic scenario for Irish industry because of the rationalisation process. He comments that if a firm "...sees the opportunity, or feels the need, to achieve greater economies of scale through rationalisation, or to be closer to its main markets, it is not hard to imagine the activity of smaller Irish plants being absorbed into larger ones elsewhere. The reverse process seems, on balance, to be much less likely".[160] The result may be the scaling down or even closure of some Irish operations.

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[159] O'Donnell, 1989, p17-18
[160] Doyle, 17th April 1991, p9

It is generally agreed that non-tariff barriers have caused the establishment of more subsidiaries that what is economically necessary. Removal of these barriers could result in fewer firms established abroad. The presumption that electronics subsidiaries operating in Ireland will close because of the rationalisation process, while a valid argument may not necessarily be true. Indeed the opposite may transpire with new investment or expansion of existing firms occurring. Ireland could play a part in the response of non-EC firms to counteract the advantages accruing to EC competitors in the industry.

The case may also be presented that because of their motivation for investment in Ireland, the exploitation of the European market, overseas electronics firms will not suffer any adverse effects of the rationalisation of industry. They have generally invested *despite* any non-tariff barriers, consequently the elimination of barriers to trade will not have any adverse effects on employment. Indeed, as the following chapter indicates, employment has increased, though not as dramatically as hoped, in consecutive years and does not appear to have suffered through expected company rationalisation.

One aspect of the changing global computing industry, which may adversely affect the operations of US firms in Ireland, is the various technological developments which may enable the switching away from IBM operating systems. This would be very difficult to achieve, however, given both the

prominence of IBM in the international computer market and the technology problems involved in changing over much of the present hardware and software, mostly all IBM compatible, to another system. It is unlikely therefore that this will cause any decline in present operations. It may well have the effect of increasing rather than decreasing overseas investments as US firms engage in more aggressive investments to counteract potential market losses.

4.10 The Impact of the Single Market on Future Investment

As described in Chapter two a firm will invest in a particular location if that location possesses certain location specific advantages. It is reasonable to assume that the completion of the internal market will increase the location specific advantages of the EC for a variety of reasons.

European integration is expected to result in a more economically stable location with reduced unemployment and better market opportunities. It will probably cause non-EC firms to invest further within the community to protect existing markets which may be lost from the expected indirect increased competitive strengths of European producers.

All things being equal if overseas investment increases in Europe then it should also increase in Ireland, though by how much and in what industries is open to debate. Previous investment in the Irish electronics industry, particularly from the US, has occurred for a variety of reasons, low taxes, tariff free access to Europe and the supply of skilled educated relatively cheap labour.

Any increases in investment in this industry will only occur if Ireland retains its relative country specific advantages. If we assume that the previous primary motivation for investment in Ireland in the electronics industry was for tariff free access to the community then the future opening up of the market, through the SEM, would lead to the expectation that there

should be an increase in the levels of overseas investment in Ireland. Although Ireland's locational attractiveness will be increased so too are those of every other member country. Indeed Ireland is disadvantaged in that it lies on the peripherary of Europe. This disadvantage has previously been overcome through Ireland offering one of the most generous incentives packages in the community. The low rate of corporation tax, which is available until at least 2010, has in particular been one of the most important incentives in attracting overseas investment in the electronics industry.

It was feared that the harmonisation of fiscal policies with the subsequent prohibitation of state incentives deemed to distort trade between member states, would reduce Ireland's capacity to entice overseas investment. As a result of the single market state aids will be carefully monitored and "...credible sanctions against unfair support schemes will be devised, and it is hoped, consistently applied".[161]

Ireland is exempted from this clause, however, since state aid which is designed to help in the economic development of underdeveloped areas, of which Ireland easily fits the criterion, of the community is allowed. Ireland may in fact receive more investment since the Single European Act (SEA) will curtail the incentives packages offered by the richer member states, thereby increasing Ireland's relative country specific advantages.

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[161] Davis, 1989, p32

A perceived effect of the single market is that firms which are suitably competitive will be able to supply a much larger market, thus increasing its overall profits. Since Ireland offers a very low rate of corporation tax it may have the effect of enticing firms to locate more of their production facilities here for the policy of increasing profits with through lower taxes.

Not alone can an increase in US investment in the electronics industry in Ireland be projected but so too may investment from the EC. Ireland's capacity to retain its comprehensive incentives package, its ability to supply low cost skilled labour and the removal of NTB's may prompt further investment in the electronics industry in Ireland. European producers may find that they can profitably produce in the more peripheral locations and re-export their produce back to the community market.[162]

There are certain aspects of the 'new' community however which may result in a decline of Ireland's relative country-specific advantages and consequently the levels of investment in Ireland.

Two factors, particularly with respect to investment from the US, have been identified which may be perceived to affect Ireland's relative country specific endowments. The first of these factors is EC anti-dumping legislation which was adopted on 11th June 1988. The aim of this legislation is to force non-EC firms to source their inputs locally rather than

[162] O'Malley, 1990, p22

importing from affiliated companies outside the community and merely assembling the imported components for export.

This legislation may have the effect of reducing Ireland's country specific advantages both for present and future investments, since subsidiaries which establish in Ireland are in fact, these so called 'screwdriver plants'. One could therefore hypothesise that future investment in the electronics industry will be affected.

Rather than declining, however, there is evidence that US investment in the community has been increasing as a direct response to these measures. The US Bureau of Economic Affairs has noted that there has been an increase in the number of production facilities established by electronics manufacturers "... in response to a new rules-of-origin policy that imposes customs duties on 'non-European' computer chips".[163]

It is difficult to access the implications of this increased investment on the future expansion of the Irish electronics industry. This type of investment is driven by the "...ability to provide local sub-supply of parts to a high standard of design and quality is likely to be an important factor in influencing the location of these investments".[164] These firms would probably locate their production facilities in the more developed markets.

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[163] March 1991/ Vol 71, No3, Survey of Current Business, p28
[164] O'Donnell, 1989, p25

The small size and lack of experience of indigenous suppliers would probably act as a primary disincentive for locating these facilities in Ireland. While Ireland will not gain to any significant degree from this investment it is unlikely to suffer any considerable adverse effects from this EC legislation.

It is the ascension of low labour cost locations such as Spain and Portugal to the European Community that may yet have the most severe impact on overseas investments in the Irish electronics industry. It has been feared that since Spain lies on the European mainland and given that it is a low labour cost location, with the capacity to supply the manpower for the relatively unskilled computer assembly manufacturing process, then US overseas investment may switch away from the more semi-peripheral areas of Europe to this location.

Empirical findings by Jacobson would give credence to this viewpoint. He notes that the capital expenditure of US firms in the EC has increased in Spain relative to Ireland.[165] Tables 4.10.1 and 4.10.2 below indicate total capital expenditures[166] of US manufacturing firms and expenditures in the electronics industry in the twelve member countries respectively.

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[165] Foley, 1990, p315-316

[166] For affiliates other than those engaged in natural resource exploration and development, capital expenditures include all expenditures that are charged to capital accounts and that are made to acquire, add to, or improve property, plant and equipment. Capital expenditures are on a gross basis, sales and other dispositions of fixed assets are not netted against them. (p21 Survey of Current Business March 1988 Vol.68 No 3)

Total manufacturing data was available over the period 1978-1991 while only available over 1981-1991 in the Electric and Electronic Equipment industries. Data was derived from the 'Survey of Current Business', by the US Bureau of Economic Affairs.

Table 4.10.1

TOTAL US CAPITAL EXPENDITURE IN THE EC ($ Mil.) 1978-'91						
Year	*Belgium*	*Denmark*	*France*	*Germ.*	*Greece*	*Ireland*
1978	438	145	1,597	2,731	-	215
1979	767	216	1,827	3,628	-	354
1980	765	246	2,237	4,573	-	222
1981	807	244	1,780	3,310	61	274
1982	704	297	2,049	3,540	92	244
1983	499	337	1,854	2,953	44	189
1984	506	239	1,733	2,927	41	215
1985	529	241	1,986	3,498	37	279
1986	664	210	2,027	3,386	18	245
1987	641	157	2,235	3,328	36	252
1988	705	201	2,387	4,212	30	261
1989	1,031	217	2,684	4,457	45	403
1990	1,451	245	3,516	5,690	54	528
1991	1,516	254	3,874	6,723	51	617

Table 4.10.1 (cont)

TOTAL US CAPITAL EXPENDITURE IN THE EC ($ Mil.) 1978-'91						
Year	*Italy*	*Lux.*	*Neth.*	*Port.*	*Spain*	*UK*
1978	859	438	908	-	496	5,666
1979	1,093	767	1,582	-	768	6,582
1980	1,302	765	1,091	-	932	7,580
1981	1,146	36	1,163	76	1,067	8,100
1982	1,277	24	1,724	109	1,148	8,521
1983	851	41	1,288	79	541	5,685
1984	773	44	1,641	55	502	6,497
1985	872	45	1,744	51	570	6,716
1986	878	134	1,166	49	451	4,997
1987	1,028	200	1,114	69	540	5,886
1988	1,154	160	1,158	65	818	6,840
1989	1,435	85	1,397	106	1,075	9,755
1990	2,126	84	2,085	136	1,316	11,780
1991	1,951	72	2,127	148	1,366	13,356

Table 4.10.2

US CAPITAL EXPENDITURE IN THE ELECTRONICS INDUSTRY IN THE EC ($ Mil.) : 1981-'91						
Year	*Belgium*	*Denmark*	*France*	*Germ.*	*Greece*	*Ireland*
1981	37	5	55	138	2	-
1982	41	-	47	157	1	7
1983	37	7	52	145	-	6
1984	42	8	50	174	-	18
1985	45	7	63	194	3	-
1986	-	2	56	262	-	38
1987	14	1	57	190	-	35
1988	-	1	54	191	1	35
1989	35	-	63	168	1	37
1990	34	10	109	193	-	38
1991	39	-	130	222	1	42

Table 4.10.2 (cont)

US CAPITAL EXPENDITURE IN THE ELECTRONICS INDUSTRY IN THE EC ($ Mil.) : 1981-'91						
Year	*Italy*	*Lux.*	*Neth.*	*Port.*	*Spain*	*UK*
1981	40	-	15	2	30	151
1982	48	-	14	2	31	184
1983	38	-	17	-	28	118
1984	47	-	19	-	29	162
1985	61	-	19	-	33	200
1986	66	-	14	9	19	104
1987	50	-	31	-	20	141
1988	-	4	21	-	21	-
1989	56	1	150	-	-	219
1990	67	-	161	-	63	225
1991	77	1	214	-	38	235

Over the period 1978 to 1991 total US capital expenditure in the now twelve EC countries has significantly increased, from $13.5 billion to $32 billion. This corresponds to an increase of over 130%. The UK and Germany account for a considerable proportion of this investment, the former accounting for 42% (or $13.3 billion) and the latter 21% ($6.7 billion) in 1991. The levels of US, as a percentage of total, investment in these countries, as indeed is the case with almost all of the other EC member countries, has remained relatively constant over the past decade.

In 1991 Ireland's percentage share of total US capital expenditure was just under 2%, a slight increase since 1978. Marginal decreases occurred in Denmark, Italy and France with Luxembourg showing a more significant decline; from 3.25% to 0.2%. Investment in the Netherlands has remained the same but increased by 1.5% to 4.7% in Belgium.

Although investment has increased in Spain it does not appear to have been by any significant degree. Investment has increased marginally from 3.7% of the EC total to 4.3% between 1978 and 1991. It appears that most of this increase in investment, marginal though it is, has occurred as one would expect following Spain's entrance to the community. This represents US firms investing to protect existing or exploit new markets. It does appear that both Spain's and Portugal's entry to the common market has not been marked by any significant US changes in investment strategies.

The data indicates that, in total, there has not occurred any shift in the location of overseas US investments. Investment in the electronics industry has, however, declined slightly over the period 1981 to 1991. In 1981 total capital expenditure in EC countries in the electronics industry was $475 million, or 3.5% of the total, subsequently increasing in value terms to $999 million, but nevertheless declining slightly to 3.1% of total.

Over this period investment has tended to be switched away from both the UK, one of Ireland's main competitors for foreign investment, and Germany. Investment in electronics has decreased in percentage terms from 32% ($151m) and 29% ($138m) to 23% ($235) and 22% ($222m) in both these countries respectively. Capital expenditure in Belgium has marginally increased from $37m in 1981 to $39m in 1991, but in real terms has been halved. The most dramatic increase in capital expenditure occurred in the Netherlands where it increased from 3.2% of the EC total to 21.4%, over the period 1981 to 1991.

The most interesting aspect of this data is an analysis of Ireland's performance, especially with respect to Spain. Previous discussions have commented that apart from the direct or indirect effects of market unification or EC antidumping legislation Spain's entry, as a low cost labour location, could have the effect of reducing US investment in Ireland.

Though there has been increased investment by US affiliates in Spain it would appear to be slight and has generally not had any considerable negative impact on Ireland. US capital expenditure has increased by a considerable amount in Ireland, from $7 million in 1982 to $42 million in 1991, or from 1.3% of EC total to 4.2%. In comparison investment in Spain has risen from $31 million to $38 million over the same period, in real terms declining, however, from 5.8% to 3.8%.

Over most of the period 1986-1991, excepting 1990 when investment in Spain was higher, the value of investment by US affiliates in Ireland was higher than in Spain. The only recent year in which investment in Spain was substantially higher than in Ireland was, as noted previously, in 1990 when it was $63 million against Ireland's $38 million.

It is unclear what caused this increase in investment. It may have been caused by new investments in the industry in Spain following its entry to the EC or from a substantial increase in investment by one or more firms in existing plants. It should be noted that this increase in capital expenditure in Spain did not directly cause any reduction in the levels of investment in Ireland. Capital investment in Spain has subsequently returned to the levels which are slightly lower than those in Ireland.

It would therefore appear that both Spain's entry to the EC combined with the expected effects, both direct and indirect, of the SEM have not had any

serious adverse consequences for US investment in the Irish electronics industry. Indeed, Ireland has managed to increase the value of capital expenditure from the US even when total investment in electronics has been declining.

Over at least the shorter term investment in electronics in Ireland will continue to increase provided the attraction of this country for foreign investment is not considerably weakened by future changes in government policy. Such changes may not in fact be necessarily linked either to Ireland or the EC. It could result from proposed changes in US tax legislation which, if implemented, would force US multinationals to make royalty payments at market rates and consequently reduce Ireland's country-specific advantages.[167]

[167] Foley, 1990, p318

4.11 Conclusions

Using the eclectic paradigm overseas investment in the Irish electronics industry was described as occurring as a result of the location specific advantages possessed by this country. Ireland as a choice of location for overseas investment increased substantially following the change in government economic policy in the 1950's.

Investment in Ireland can be directly related to the desire of manufacturers, especially those from the US, to establish subsidiaries and exploit the European market from a tariff free location while also availing of various incentives some of which may in fact be used to help reduce overall tax liabilities. Thus it was Ireland's entry into the EC combined with the generous incentives package, particularly from EPTR and the subsequent low levels of corporation tax, which has resulted in overseas electronics investment.

This type of investment has had direct implications for the types of electronics manufacturing operations carried out in Ireland. These subsidiaries can be described as manufacturing satellites only and generally do not carry out many of the key business function of a company's business, such as marketing and so on.

Those operations which are carried out generally consist of assembly work, packaging and basic testing only. Although some product customisation or

development work is carried out it is by far a rarity. This is both as a result of the characteristics of multinationals in general, as described in Chapter three, and a reflection of the consequences of offering the particular types of incentives package in Ireland. Those firms wishing to avail of minimal taxes will not carry out substantial research and development, characterised by extremely high costs in this industry, nor would they carry out significant marketing or other business functions as these costs incurred would reduce net profits and subsequently remove the advantages of low corporation tax rates.

Continued investment, following the SEM, in the electronics industry is likely to occur only if Ireland can retain its relative country specific advantages. Since Ireland, unlike other countries, can retain its comprehensive incentives package it is unlikely that the single market will have any adverse impact on investment. Existing firms are therefore unlikely to be forced to scale down their operations either because of the direct or indirect effects of market unification. Indeed the opening up of markets may enable these firms to exploit the EC to a higher degree.

A combination of factors leads to the expectation that investment from both EC and non-EC countries, rather than declining, may in fact increase. Through barrier removal EC firms may have the greater ability to establish subsidiaries in Ireland (to avail of low labour costs, tax incentives an so on) and then re-export products to the EC market. Similarly US firms, to

counter the expected increase in efficiency of European firms, may choose to locate their investments in Ireland, again to avail of the various incentives which will be retained even after the harmonisation of fiscal policies. Changes in EC policy towards anti-dumping legislation is also unlikely to affect overseas investment from the US in Ireland. To counteract this law these firms are in the process of establishing affiliates in Europe to act as suppliers. It is unlikely, however, that Ireland will gain substantially from this investment.

Spain's entry to the EC has not been marked any significant changes in US investment in the Irish electronics industry. Capital expenditure in the industry in Ireland has risen from 1.3% of EC total to 4.2%. In comparison investment in Spain fell from 5.8% to 3.8% over the same period. Indeed over most of the latter period of the 1980's investment in Ireland was higher than in Spain. Over at least the shorter term it is expected that overseas investment in the electronics industry will continue to increase, though the current recession is likely to mean that its growth will be substantially lower than in the early 1970's.

CHAPTER FIVE

THE ELECTRONICS INDUSTRY IN IRELAND

5.1 Introduction

The electronics industry consists of three different subsectors, the manufacture of computers and the manufacture of passive and active components. This corresponds to the data processing (O & DP), equipment for telecommunications (ET) and radio & television receivors (R & T) sectors. This chapter examines the characteristics of each of these subsectors in detail under the trends of employment, overseas ownership and exportation.

Section 5.2 discusses the changing trends of employment in the industry. It follows the trends of employment in the industry from the year of Ireland's entry into the Economic Community to the latest year data was available. Section 5.3 provides a comparison of the changing patterns of employment in manufacturing industry over the same period. The growth of the industry with respect to the same sectors in each of the other EC countries is included in 5.4.

The contribution and trends of overseas firms to employment in the three sectors is discussed in section 5.5. For comparison purposes it also details the extent of overseas ownership of Irish manufacturing industry. The final section discusses the propensity of exportation within manufacturing industry in general and specifically within the electronics industry. Also included is a discussion of the location and value of output which is exported.

5.2 Trends of Employment in the Electronics Industry

Chapter four used the eclectic paradigm to describe the motivations for investment by overseas firms in the electronics industry in Ireland. It concludes that in general firms invested because of a combination of factors; government incentives, primarily from the 10% Corporation tax, and the ability of firms to engage in 'tariff jumping' via Ireland's full participation in the Economic Community.

Assuming overseas firms heavily dominate the sector, which in fact they do, it is expected that employment would have grown substantially over the period beginning with Ireland's full membership to the EC.

The timing of Ireland's entry to the EEC coincided with the development and refinement of the microchip and later the integrated circuit. This in turn resulted in the phenomenal growth of the industry worldwide. As a direct consequence of the dramatic decrease in the cost of microchips manufacture there resulted a corresponding increase in demand. It is estimated that the cost per electronic function fell by a factor of 100,000 over the period 1960 to the late 1970's. In the late 1970's it dropped to less than $0.0005 in the 16k RAM's (Random Access Memory) from $50 in the mid 1960's.[168]

[168] Dicken, 1986, p362

Substantial decreases in costs of production led to greater applications of semiconductors in a wider range of industrial and business activities. This increase in demand has invariably lead to greater employment. Reduction in the costs of production is more significant, however, to the computing industry rather than to microchip manufacturers. Since microchip manufacturers may avail of increasingly sophisticated automated manufacturing techniques there may not necessarily be a corresponding significant rise in employment.

Trends of employment in the Irish electronics industry may be considered by examining the numbers employed in the three comprising sectors: Office & Data Processing, Equipment for Telecommunications, and Radio and Television Receivors, and comparing them to manufacturing industry in total. Table 5.2.1 below provides employment figures for the year 1973, marked by Ireland's ascension to the EC, through to 1988. Reliable data is unavailable for R & T for 1973 and 1974.

TABLE 5.2.1

NUMBERS EMPLOYED IN MANUFACTURING, O & DP, ET AND R & T; 1973-1988[169]

Year	*No. Employed in Man.*	*O & DP No.*	*As % Man.*	*ET No.*	*As % of Man.*	*R & T No.*	*As % of Man.*
1973	207,568	1,002	0.5	2,170	1.0	-	-
1974	210,193	1,200	0.6	2,045	1.0	-	-
1975	195,093	1,351	0.7	2,669	1.4	2,305	1.2
1976	197,666	1,720	0.9	2,576	1.3	2,481	1.2
1977	204,140	2,315	1.1	2,967	1.4	2,828	1.1
1978	207,530	2,496	1.2	3,334	1.6	2,412	1.2
1979	217,514	3,496	1.6	2,987	1.4	3,086	1.4
1980	226,800	4,726	2.1	3,622	1.6	3,109	1.4
1981	223,630	6,021	2.7	3,950	1.8	2,938	1.3
1982	214,424	5,256	2.4	4,377	2.0	2,754	1.3
1983	202,928	5,850	2.9	4,311	2.1	2,926	1.4
1984	196,156	6,386	3.3	4,601	2.3	3,376	1.7
1985	187,221	6,071	3.2	5,196	2.8	2,902	1.5
1986	185,109	5,981	3.2	5,626	3.0	2,437	1.3
1987	183,080	6,097	3.3	5,745	3.1	2,598	1.4
1988	185,040	6,586	3.6	6,037	3.3	2,995	1.6
1973-88	-10.8	557.3		178.2		29.9[170]	
1973-80	9.3	371.7		68.7		34.9[171]	
1980-88	-18.4	39.4		66.8		-3.7	

[169] Statistical Abstracts 1977-1990, Census of Industrial Production (CIP) 1984 & '88
[170] Percentage change 1975-1988
[171] Percentage change 1975-1980

Over the period 1973-88 employment in the electronics industry increased by approximately 185%, or 10,141 persons. In 1988 the industry employed 15,618 persons, a substantial 8.4% of total manufacturing employment; more than double its 1975 share of 3.2%.

Substantial differences in the trends of employment occurred in the three constituent sectors of the industry over the period. Average employment in O & DP and ET increased significantly while in R & T it increased in proportion only slightly.

Data processing and telecommunications equipment account for the greatest numbers employed and the most significant percentage increases. Employment in the former sector rose from 1,002, or 0.5 % of manufacturing total, to 6,586, 3.6% of manufacturing total, between 1973 and 1988. This represented an increase in employment of 557% compared with a decline in total manufacturing employment of just under 11%.

The telecommunications industry also increased its percentage share of manufacturing employment, from 1.0% to 3.3% over the same period. This was equivalent to a rise in employment from 2,170 to 6,037, or an increase of 178.2%. Similar trends did not occur in the R & T sector. Employment rose only slightly, from 2,305 in 1975 to 2,995 by 1988. Nevertheless this increase occurred when average manufacturing employment was declining.

The most substantial increase in employment of all subsectors of the electronics industry occurred in data processing over the period 1973-'80. Employment rose from slightly over a 1,000 to 4,726 or a 372% increase. In contrast manufacturing employment increased by 9.3%.

The largest increase in the numbers employed in this sector occurred over the period 1977 to 1980 when employment more than doubled, from 2,315 persons to 4,726. Several factors may be attributed to the rise in employment over this period. With the dramatic reduction in the costs of electronics components production and the wider applications of computers, by both manufacturing and services industries, demand substantially increased. This increase, particularly in European consumer demand, resulted in firms establishing manufacturing satellites in Ireland to supply this market, thereby increasing employment. Indigenous firms did not account for any significant increase of the proportion employed.

This reliance on both overseas multinationals and the European market means that the trends of employment in the computer assembly industry fluctuates with European consumer demand patterns. It may also be hypothesised that employment in indigenous firms operating in the O & DP sector may also fluctuate with the demand patterns of the multinationals or the EC market, as they either act as sub-suppliers to overseas firms or operate in the smaller market niches not occupied by them and supply directly the indigenous or EC market.

Reliance on the European market resulted in an unexpectedly poor performance of the industry in the early to mid-1980's. The combination of a world glut in the semiconductor market, the effects of cheap imports from outside the EC and recession together with ever increasingly automated processes for final product manufacture resulted in a slowing down in the employment growth of the data processing sector over this period. The combination of these factors together with increased competition from other European countries for investment has resulted in an unexpectedly lower growth performance than predicted.

Employment rose by 39.4%, from 4,726 to 6,586, over the 1980-'88 period. This was considerably lower than the percentage increase over the 1973-'80 period. Considering the years 1981-'88 the percentage increase is even lower, at 9.4%, with employment rising only from 6,021 to 6,586.

Another suggested reason for the lower average growth performance of the sector is related to the removal of Export Sales Relief, in the early '80's, and its replacement with the 10% Corporation tax. It is argued that this has resulted in a decline in the attractiveness of Ireland as an investment location.

This is not entirely convincing since other allowances, for example depreciation, may result in even the modest by international standards 10% tax effectively reduced to zero. A more plausible explanation, given that the

majority of those employed in the industry work for a US owned affiliates, is that the growth of US manufacturing investment in the electronics industry in Europe has been virtually stagnant. In fact US capital expenditure in the electronics industry, as a percentage of total invested, declined from 3.5% to 3.1% over the period 1981 to '91. (See Chapter four, section 10) This stagnation in overall expenditures resulted in a fall off in the annual percentage increase in employment.

Indigenous employment in the data processing sector did not increase by any substantial amount over this period. It did not sufficiently expand to offset the decline of investment by overseas multinationals. Several reasons are suggested for the failure of the development of this sector. One reason put forward is that since indigenous firms are considerably smaller than their overseas counterparts they do not have the capacity to develop their employment substantially or withstand periods of recession.

Census data indicates that the average number employed by an indigenous firm in the O & DP sector is 18. The corresponding figure for an overseas firms is 225, over twelve times larger.[172] In a period of recession one could expect that these firms will be most adversely affected.

A period such as this normally results in the decline of small scale manufacturers. This combined with the highly competitive nature of the

[172] CIP, 1988

electronics industry leads to the expectation that during the 1980's the number of smaller sized indigenous electronics firms would have been either inhibited in their growth performance or ceased production completely. Therefore they could not offset any decline in the levels of investment by overseas firms.

Unlike the data processing sector the telecommunications sector had a relatively constant uninhibited growth. By 1988 it employed just over 6,000 persons, slightly below that for O & DP. Employment rose from 2,170 to 6,037 persons that is by 178.2% (-10.8% for manufacturing) between 1973 and 1988 with a 68.7% increase (9.3%) over the period 1973-'80 and a 66.8% increase (-18.4%) over 1980-'88.

The data indicates that this sector was not as adversely affected by the recession in the 1980's and demonstrates similar trends of employment in the 1970's and 1980's. Over the entire 1980 period employment declined just once, between 1982-'83, and this was by only 66 persons.

The primary reason for the generally uninhibited growth of this sector is that although the electronic components manufactured in this sector are used in computer assembly, they are not restricted to this application. Through the increasingly diverse applications of electronic components there has been an increase in demand, hence employment, which has offset the possible employment losses due to the slump in the computing market.

Of the three subsectors of the electronics industry the R & T sector would appear, in terms of trends of employment, to be the exception. Among others this sector consists of the manufacture of active components such as semiconductors and printed circuit boards (pcb's). Between 1975 and 1988 employment rose by just 690. All of this employment increase occurred over the 1975 to 1980 period. Over the period 1980 to '88 there was a decline of 3.7% in the numbers employed.

This sector did not experience any employment growth for several reasons. Increased employment occurs either through the development or expansion of indigenous firms or from increased overseas investment. CIP data indicates that the majority of those engaged in this sector are employed by overseas firms, each employing an average of 133.4 persons.[173] Indigenous firms typically employ 10.7 persons thus limiting their potential for expansion. Therefore it is expected that substantial growth cannot occur through indigenous firms.

Employment growth may be deemed to occur only through overseas investment. The trends of this investment would obviously affect the trends of employment. Investment in R & T has been, and is likely to remain, lower than the other two subsectors of electronics. This is predominantly due to the characteristics of the industry.

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[173] CIP, 1988

The manufacture of semiconductor devices is a very sophisticated process involving highly trained personnel with sophisticated equipment. Products have very short life cycles and require constant adaptation/modification. This would distinguish this industry from the investment which has occurred in both O & DP and ET which employ much lower skilled labour in assembly or mass production operations. Multinationals do not perceive Ireland as having any specific locational advantages for this type of operation and consequently there is minimal investment.

The nature of the ownership of the industry is another determining factor. Unlike ET, and especially O & DP, a considerable amount of the global industry is owned by non-US firms. A significant proportion of these are Japanese owned firms who have not invested in Ireland, for a variety of reasons, to any considerable degree. It is unlikely therefore that any substantial growth of this sector will occur in the future in Ireland.

While the trends of employment of the electronics industry may differ they do have a common underlying characteristic, that is a significant proportion of each is owned by overseas interests. The exact trends of this employment will be discussed in section 5.5.

5.3 Trends of Employment in Manufacturing Industry

Since Ireland's entry to the European Community, different manufacturing industries have grown or declined by varying degrees. Previous discussions have shown that electronics, a subsector of the Metals & Engineering industry, is one of the growth industries. By comparing the trends of employment in electronics with all other manufacturing industries its growth may be placed into perspective.

Total employment in manufacturing industry has declined over the period since Ireland's assession to the EC. Employment increased until the early 1980's, subsequently falling in consecutive years. Table 5.3.1 provides a comparison of employment levels by industry over the period 1973 to 1988. Data for the electronics industry is also included for comparison. Total employment refers to all industries and excludes outside piece workers in 1980 and 1988.

The data indicates that over the period 1973 to 1988 all industries, excepting those in the new high technology sectors, reduced their employment levels. Only in Chemicals, Metals and Engineering (electronics being a sub-sector) and Miscellaneous Industries did employment increase. The corresponding figures were a 28.9%, 23.8% and 29.1% increase respectively.

Table 5.3.1

NUMBERS EMPLOYED, AND PERCENTAGE CHANGE IN, BY NACE CLASSIFICATION; 1973 to 1988[174]						
Nace	*1973*	*1980*	*1988*	*Percentage Change*[175]		
				1973-'88	*1973-'80*	*1980-'88*
11,21,23,	10,353	11,739	6,467	-37.5	13.4	-44.9
13,16-17	15,177	16,353	14,324	-5.6	7.7	-12.4
24	13,048	15,639	10,724	-17.8	19.9	-31.4
25-26	9,705	12,310	12,510	28.9	26.8	1.6
22,31-37	48,955	66,124	60,606	23.8	35.1	-8.3
33	***1,022***	***4,683***	***6,586***	***557.3***	***367.6***	***40.6***
344	***2,170***	***3,662***	***6,037***	***178.2***	***68.7***	***66.6***
345	***2,305***[176]	***3,109***	***2,995***	***29.9***[177]	***34.7***[178]	***-3.7***
411-423	46,195	47,752	37,480	-18.9	3.4	-21.5
424-429	10,250	10,354	6,779	-33.9	1.0	-34.5
43	21,189	16,327	10,505	50.4	-22.9	-35.7
44	2,099	1,538	515	75.5	-26.7	-66.5
451-456	22,412	18,869	13,130	-41.4	-15.8	-30.4
46	8,648	9,850	7,238	-16.3	13.9	-26.5
47	16,313	16,316	14,184	-13.0	0.0	-13.1
14,48-49	8,754	11,689	11,369	29.9	33.5	-2.7
Total all Industries	233,098	254,860	205,831	-11.7	9.3	-19.2

[174] Statistical Abstracts 1977, CIP 1980 & '88

[175] Compared with table 5.2.1 slightly different trends of employment in electronics occurs. This is due to slight variations between Statistical Abstracts and CIP data.

[176] 1975 Employment data

[177] Percentage change 1975-1988

[178] Percentage change 1975-1980

Figure 5.3.1

NACE CLASSIFICATIONS	
Nace Code	*Industrial Sector*
11,21,23	Mining, Quarrying and Turf
13,16-17	Electricity, Gas and Water
24	Manufacturing of Non-Metallic Mineral Products
25-26	Chemicals
22,31-37	Metals & Engineering
33	Office & Data Processing
344	Equipment for Telecommunications
345	Radio & Television Receivers
411-423	Food
424-429	Drink & Tobacco
43	Textile Industry
44	Leather & Leather Goods
451-456	Footwear & Clothing
46	Timber and Wooden Furniture Industries
47	Paper and Paper Products, Printing and Publishing
14,48-49	Miscellaneous Industries

Employment fell by over 30% in five of the thirteen industries. Not unexpectedly the traditional sectors were most severely affected. The Leather and Leather goods industry, for example, yielded a fall of 75% in the numbers employed. Of those remaining there was a 50% decline in the Textiles industry and a 41% decrease in Footwear and Clothing, a 37% fall in Mining and finally a 34% decrease in employment in the Drinks and Tobacco industry. The decline in employment was less than 20% for each of the remaining five industries.

Over the total period the underlying trend was an 11.7% decrease in total industrial employment. Again this places the performance of the electronics industry, and indeed the newer overseas controlled industries into perspective. Employment increased by 557.3% and 178.2% for O & DP and ET respectively. In the remaining electronics sector employment increased by 29.9% over the period 1975-'88. On average total employment in the electronics industry increased by just over 185%.

Employment rose most significantly in almost all industries over the pre-recessionary years 1973 to 1980. Employment fell in only three of the thirteen industries. As expected these occurred in the more traditional sectors, Textiles (a 22.9% decline), Leather & Leather Goods (a decline of 26.7%) and Footwear & Clothing (by 15.8%). This occurred as a result of a combination of factors, most notably cheaper imports and increased international competition.

The remaining ten industries experienced a period of growth, once again dominated by the newer industries. Employment rose by 35.9% in Metals and Engineering while a 26.8% increase in employment was recorded for the Chemicals industry. In comparison there was an average increase of 9.3% for total industrial employment over the same period.

Significant differences occurred over the period 1980 to 1988. Employment fell in each industry excepting Chemicals which yielded a minimal 1.6% increase. Employment in Metals and Engineering fell by 8.3% though it was one of the lowest over the period. Total industrial employment fell by almost a fifth, that is 19.2%. Employment in electronics, however, increased on average by 36.3% with ET having the most significant percentage increase, at 66.6% compared with 40.6% for O & DP and a decline of 3.7% in R & T. The comparable figure for total industrial employment was a 19.2% decline.

The data indicates that total employment in the electronics industry has been increasing over a period when total industrial employment has been declining. Much of this decline has occurred in the more traditional indigenous owned sectors. Overseas dominated industries in the newer high technology industries have not declined to the same degree.

5.4 Trends of Employment in the EC Electronics Industry

This section compares the trends of employment in the Irish electronics industry to that of the EC. When comparing these trends it is important to note that the numbers employed in the Irish electronics industry is very much lower than the numbers engaged in many of our EC neighbouring countries. Percentage changes in employment must therefore be evaluated in this context. Nevertheless a useful comparative analysis of the performance of the industry can be obtained.

Tables 5.4.1, 5.4.2 and 5.4.3 compare the trends of employment in Ireland to the EC for O & DP, ET and R & T respectively. Data is available for data processing over the period 1974-'88 but is only available for short term analysis in the remaining two sectors over 1981 to '87.

No data is available for Luxembourg in the data processing industry or for Belgium, Luxembourg, Denmark or the Netherlands in both telecommunications equipment and radio and television receivors.

Some 'distortion' of the data occurs as a result of EC variations in defining various industrial sectors. The result is different total employment figures when compared to the previous sections. It does not, however, affect the overall comparison of the trends of employment.

Table 5.4.1

EMPLOYMENT IN DATA PROCESSING ('000) IN EC MEMBER STATES; 1974 TO 1986[179]								
Year	*Germ -any*	*Fran.*	*Italy*	*Neth.*	*Belg.*	*UK*	*Irl.*	*Den.*
1974	95.1	33.5	48.0	9.4	2.0	76.7	1.2	-
1975	89.0	42.2	49.3	9.3	1.7	71.8	1.3	-
1976	81.6	41.8	48.0	8.8	1.5	66.6	1.8	-
1977	74.6	43.5	47.0	8.2	1.0	67.7	2.0	1.6
1978	75.2	46.6	46.9	8.2	1.0	65.6	2.2	1.7
1979	75.3	45.8	44.5	8.3	1.0	83.0	2.9	2.1
1980	77.3	48.2	48.4	8.4	1.0	74.5	4.0	2.7
1981	77.3	50.3	44.3	8.4	1.0	79.2	5.0	1.9
1982	71.5	52.4	44.8	7.0	1.3	74.0	5.3	2.4
1983	70.7	54.1	44.2	6.9	1.4	73.8	5.6	2.3
1984	72.5	57.3	44.0	7.7	1.6	72.0	8.0	2.4
1985	76.6	59.1	52.3	7.6	1.7	74.9	68.8	2.3
1986	81.1	61.2	-	8.2	2.1	91.2	9.2	-

Relative to the EC Ireland's performance in terms of trends of employment, in the Office & Data Processing sector, through the mid 1970's to the mid 1980's has been impressive. According to the data employment rose from 1,200 in 1974 to 9,200 in 1986, an increase of 670%.

No other EC member country experienced this large percentage increase. France, the next highest, had an 82.2% increase in the numbers employed over the same period. All remaining countries had a rise in employment of

[179] Eurostat, Employment & Unemployment 1988 & 1982; Table III/4

less than 10% excepting the UK which experienced a rise of 18.9%. Germany and the Netherlands had a reduction in the numbers employed of 14.7% and 12.8% respectively.

Considering shorter terms, that is, the 1974 to 1980 and the 1980 to 1987 periods, the trends of employment within the EC remain much the same. The EC average for both these periods was an estimated 4.8% decline over 1974 to 1980 and a 7.6% increase in employment over the 1980 to 1986 period. In each of these periods no EC country surpassed Ireland with respect to average percentage growth. Over the earlier period employment in the Irish data processing sector rose by 225% with the latter period showing somewhat lower at figure of 130%. Nevertheless this was substantially higher than the EC average.

While employment in the Irish electronics industry is significantly lower than in the EC its percentage share of total employment has increased since 1974. Ireland accounted for an estimated 3.5% of total EC employment in this sector in 1986, significantly higher than the 0.4% in 1974 and 1.5% in 1980.

Tables 5.4.2 and 5.4.3 below detail the changing trends of employment in the remaining two sectors in ET and R & T over the period 1981-1987.

Table 5.4.2

EMPLOYMENT IN TELECOMMUNICATIONS EQUIPMENT ('000) IN EC MEMBER STATES; 1981-1987[180]					
Year	*Germany*	*France*	*Irl.*	*Italy*	*UK*
1981	358,077	105,235	3,571	58,971	228,736
1982	358,681	102,900	-	61,197	217,295
1983	354,414	99,027	3,264	64,934	213,364
1984	373,144	-	4,265	78,017	219,427
1985	409,977	96,966	5,137	57,937	211,765
1986	-	88,377	5,611	-	211,873
1987	-	82,162	5,837	51,415	207,322

Table 5.4.3

EMPLOYMENT IN TELEVISION RECEIVORS ('000) IN EC MEMBER COUNTRIES; 1981-1987[181]					
Year	*Germany*	*France*	*Irl.*	*Italy*	*UK*
1981	103,357	132,872	4,391	70,985	60,665
1982	93,973	137,026	-	57,234	54,233
1983	91,444	141,875	5,203	60,104	55,994
1984	85,649	-	6,243	48,004	60,525
1985	79,786	143,579	5,419	50,294	59,163
1986	-	136,349	4,987	44,124	60,415
1987	-	140,679	4,916	45,129	64,496

[180] Eurostat, Structure & Activity of Industry, Various Issues
[181] Eurostat, Structure & Activity of Industry, Various Issues

On a percentage change in employment basis, and where data is available for sufficient analysis, Ireland fares better than in the other EC countries in both ET and R & T. However, it must be noted that the numbers employed in the four other EC countries, in both sectors are considerably greater than in Ireland. Again this is as expected due to their much higher total industrial employment.

While the numbers employed in the two electronics sectors in the EC may be greater than in Ireland their percentage shares of total manufacturing employment are broadly similar, thus allowing a comparative analysis to be made. For example Eurostat data indicates that in 1987 ET accounted for 3.7% of total manufacturing employment in Ireland. This was broadly comparable to the EC average of 3.9%. The R & T sector employed 3.1% of the manufacturing total in Ireland, which is slightly higher than the EC average of 2.0%. This is probably higher due to the amalgamation in Ireland alone of Nace 345 with 346 in Eurostat data.

Both Irish sectors recorded a higher percentage increase in employment than in other EC countries. Telecommunications employment increased by 63.4% in Ireland against a significantly smaller increase in Germany and a decline of 21.9%, 12.8% and 9.4% in France, Italy and the UK respectively.

In the remaining sector, R & T, employment increased in Ireland by 11.9%. This compares with an increase of 5.9% in France and 6.3% in the UK and a decline of 36.4% in Italy. The numbers employed in R & T in Germany have been declining from the early to mid 1980's, falling by 22.8% to just under 80,000.

The primary reason for the decline in the numbers engaged in the EC is related both directly and indirectly to the continued erosion of European markets by US and Japanese firms. Employment is reduced directly as a result of lost markets and indirectly due to forced rationalisation to maintain competitiveness. Both the US and Japan have continued to increase their market shares particularly in the Information Technology industry.

In summary the data indicates that the trends of employment have been higher in Ireland in each subsector, especially data processing, of the electronics industry. Employment in Ireland has not suffered since it relies not on indigenous firms competing with both EC and non-EC multinationals but rather from overseas investment, particularly from the US. One could argue that the greater the penetration of the European market by non-EC firms, particularly from the US and possibly Japan, the greater the prospective increases in employment in the Irish electronics industry.

5.5 Employment & Overseas Industry

5.5.1 Overseas Industry & Industrial Employment

It has previously been established that the rise in employment in the high technology sectors in Ireland, that is pharmaceuticals, chemicals, electronics and so on occurred as a result of the increased scale of overseas investment. The following sections will detail the trends and contribution of overseas firms to employment in the various industrial sectors.

The importance of the degree of overseas ownership results from the expectations that if an industry is controlled by overseas interests then its behaviour will be seen as a reflection of the operating characteristics of multinationals in general in that sector. This effectively means that the degree of R & D, marketing and other important key business functions carried out in Ireland will be directly related to the degree of overseas ownership. (See theory of multinational behaviour, Chapters two & three)

An examination of the levels of overseas ownership by industrial sector follows and is concluded with a discussion of the trends ownership of the electronics industry by nationality of ownership.

Reliable data outlining the nature and ownership of establishments by nationality is available from CIP's 1983 to 1988 only. While some information is available for the data processing sector none is available for telecommunications equipment or television receivors over the entire period.

Some data, however, was obtained for the latter two sectors for 1988. No significant changes in the nationality of ownership of the industry has occurred over the recent past. Therefore present discussions of the trends of ownership of the electronics subsectors may be projected back over a much longer period.

Table 5.5.1.1 below examines the trends of employment of each industrial sector by levels of ownership.

The data indicates that those industries which are predominantly Irish owned fit into the more traditional classifications. For example indigenous firms in the Timber & Wooden Furniture account for 92.0% of those employed, 89.1% in the Paper and Paper Products industry, 79.5% in the Foods industry, 70.5% in the Manufacture of Non-Metallic Minerals Products and finally 67.5% in the Leather and Footwear industries.

Another feature of the data is the importance of overseas firms as a source of total manufacturing employment. On average 44.2% of persons employed in 1988 worked for overseas firms, the remaining 55.8% working for indigenous firms.

Table 5.5.1.1

NUMBERS EMPLOYED IN BROAD INDUSTRIAL SECTORS CLASSIFIED BY NATIONALITY OF OWNERSHIP; 1988[182]							
Nace[183]	*Irish*	*Overseas*	*Total*	*% Irish*	*% Total*	*% Over.*	*% Total*
24	7,558	3,166	10,724	70.5	4.1	29.5	1.7
25-26	2,948	9,562	12,510	23.6	1.6	76.4	5.2
22,31-37	24,724	35,882	60,606	40.8	13.4	59.2	19.4
33	***288***	***6,298***	***6,586***	***4.4***	***0.2***	***95.6***	***3.4***
344	***1,703***	***4,334***	***6,037***	***28.2***	***0.9***	***71.8***	***2.3***
345	***193***	***2,802***	***2,995***	***6.4***	***0.1***	***93.6***	***1.5***
411-423	29,812	7,668	37,480	79.5	16.1	20.5	4.1
424-429	1,926	4,853	6,779	28.4	1.0	71.6	2.6
43	3,258	7,247	10,505	31.0	1.8	69.0	3.9
44-45	9,214	4,431	13,645	67.5	5.0	32.5	2.4
46	6,659	579	7,238	92.0	3.6	8.0	0.3
47	12,646	1,538	14,184	89.1	6.8	10.9	0.8
14,48-49	4,470	6,899	11,369	39.3	2.4	60.7	3.7
Total all Manufac-turing	103,215	81,825	185,040	55.8	55.8	44.2	44.1

Overseas firms have continuously increased their percentage share of employment over the period 1973 to 1988. For example 27%, 34% and 36% worked for an overseas firm in 1973, 1980 and 1984 respectively.[184] Of the ten industries listed in the above table overseas firms employ more

[182] CIP 1988 & Unpublished Data from the Central Statistics Office (CSO)
[183] See section 5.3 for explanation of NACE codings
[184] Nesc 66, September 1983, White Paper, 1984, p62

than 50% of employees in half. A considerable proportion of this employment is located in the higher technology industries. Those most heavily dominated are the new technology industries such as Chemicals and Metals & Engineering. Seventy seven per cent of those employed in the Chemicals industry (9,562 persons, or 5.2% of the manufacturing labour force) work for overseas firms. In the Metals & Engineering industry 59.2%, or a substantial 19.4% of the total labour force, are employed by overseas firms.

Overseas industry also accounts for a significant proportion of employment in some industries outside of the newer high technology sectors. The Drinks & Tobacco, Textiles and Miscellaneous industries, for example, are controlled by overseas firms with 71.6%, 69.0%, and 60.7% of persons employed by them respectively.

Considerably higher degrees of foreign ownership are evident in the electronics industry with overseas firms accounting for 86.0% of the numbers employed, just under twice the national average. They account for 7.2% of total manufacturing employment or 16.3% of total overseas employment. This contribution towards overseas employment is higher than that for all other industries, followed by the Chemicals industry at with 5.2%.

Office & data processing and radio & television receivors are the most heavily dominated overseas sectors with 95.6% of those employed in the former and 93.6% in the latter working for them respectively. The comparable figure for equipment for telecommunications is lower, but significantly higher than the average for manufacturing, at 71.8%. An explanation for the higher indigenous presence in this sector is that barriers to entry are considerably lower because the components produced are more standardised and thus require substantially less R & D expenditures than in the other two sectors.

5.5.2 Employment by Nationality of Ownership

Just under forty five percent of those employed in manufacturing industry work for an overseas firm. Data suggests that US owned affiliates account for much of this employment. Nationally, the US was accountable for 20.8% of total manufacturing employment in 1987, while in 1988 it had risen marginally to 21.9%.

The increasing US share of overseas employment has been at the expense of the UK. In 1973 the US provided 25.3% of overseas employment. The comparable figure for the UK was 45.7%. In 1981 the former employed 41.3% while the contribution from the UK had fallen significantly to 25.6%. Latest data suggests that the US share has continued to rise to 49.5% of the total while the share from the UK has fallen to 18.7%.[185]

[185] O 'Suilleabhain, 1982, p10; CIP 1988

Unfortunately data is unavailable in the latest CIP, 1988, to provide complete information of the breakdown by nationality of ownership in the electronics industry. Data is available, however, from the CIP 1987 to provide a complete analysis for O & DP. Some data is available in 1988 for ET and R & T though, for reasons of confidentiality, it is incomplete.

In 1987 census figures indicate that 171 persons worked for indigenous firms while 533 worked for firms owned by 'other EC' countries in the data processing sector. The majority, 5393, worked for non-EC countries, with 86.3% of them working for US owned firms.

Unpublished data from the CSO indicates that in 1988 in ET 1,194 persons or 19.8% of the total were employed by 'other EC' countries, 134 were employed by UK firms, while the remaining, 3,140 (52.0%) worked for 'non-EC ' firms. No data was available for R & T. Using IDA company listings and Kompass directories it was calculated that much of the 'non-EC' employment in the R & T sector has occurred from either US or Japanese investment. It is difficult, however, to estimate the proportion owned by each but US firms were known to employ more than their Japanese counterparts.

The dominance of the electronics industry by overseas firms affects many of its trends of operation. One can hypothesise that because of the high levels of US ownership subsidiaries in Ireland will display the general

operating characteristics of US multinationals. This will be reflected in the nature of key business functions carried out in Ireland. It affects the degree and nature of technology transfer, the extent to which research and development is carried out in the host country, linkage formation, skills levels and so on. The degree of exportation is another factor directly affected by the levels of overseas ownership.

5.6 Trends of Exportation in the Electronics Industry

5.6.1 Proportion Exported by Industrial Sector

Much of early Irish industrial policy was directed towards the attraction of new export orientated overseas investment. The eclectic paradigm may be used to detail the expected trends of exportation of these firms. Dunning describes some of the newer forms of foreign investment, electronics for example, as specialisation by location.[186]

Plant operations resulting from this form of investment are technically simple and relatively labour intensive.[187] This is the general type of overseas operation found in Ireland. By applying this hypothesis, the Irish plant, is therefore just one part of the production process, that is vertically integrated. This increases the propensity for exportation.

Given the motivation for investment it is expected that Europe will be the final location for electronics products rather than the US or indeed any other non-EC market. The inherent limitations of the size of the Irish market for technologically high products, such as computer peripherals, semiconductor devices and so on, is another reason why a considerable proportion of the output from these sectors will be exported.

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[186] Dunning, November 1979

[187] O'Malley 1989, p161; Telesis, 1982, p139

This section discusses the percentage exported in the electronics sub-sectors and compares it to manufacturing industry. Section 5.6.2 discusses the value of goods exported while the final section considers the destination of exports to detail the extent to which multinationals have invested in Ireland for the establishment of an export platform to Europe.

Table 5.6.1.1 below provides a comparison of the percentage of gross output exported by all industries for the year of latest available data. Those sectors which are overseas controlled, and operate in the higher technology industries, generally have high export ratios a variety of reasons.

The limited Irish market size, tariff jumping or investment purely to take advantage of Irish incentives packages all result in these industries exhibiting high export figures.

TABLE 5.6.1.1

GROSS OUTPUT, AND PERCENTAGE OF GROSS OUTPUT EXPORTED IN MANUFACTURING INDUSTRY; 1988[188]			
Nace	*Gross Output (£,000)*	*Gross Output Exported (£,000)*	*% Gross Output Exported*
24	750,655	389,152	51.8
25-26	1,894,776	1,559,878	82.3
22,31-37	5,619,163	4,769,462	84.9
33	***2,064,709***	***2,014,462***	***97.6***
344	***529,994***	***480,366***	***90.6***
345	***625,737***	***612,531***	***97.9***
411-423	5,780,100	2,929,922	50.7
424-429	770,464	284,090	36.9
43	456,542	354,613	77.7
44-45	357,505	171,037	47.8
46	300,435	92,437	30.8
47	699,449	104,233	14.9
14,48-49	746,635	394,504	52.8
Total all Manufac-turing	17,375,635	11,049,328	63.3

Of those sectors identified in section 5.5.1 which are more than 50% owned by overseas firms (Nace 25-26, 22,31-37, 424-429, 43 and 14,48-49) all except Nace 424-429, the Drink and Tobacco sector, export more than 50% of their gross output. Of all the remaining industries only two, and these are

[188] CIP 1988 & Unpublished CSO Data

marginal, export more than 50%. These are the manufacture of non-metallic mineral products, with 51.8%, and the Foods industry with 50.7%. No indigenous dominated industry export more than the national average of 63.6% of its gross output, though it should be stressed that this figure is heavily influenced by overseas firms.

Those industries showing the greatest export propensity are Metals and Engineering with 84.9% of gross output exported, Chemicals with 82.3% and the Textiles industry with 77.7% of gross output exported.

The electronics industry shows even higher export percentages. The average percentage of gross output exported in this industry is 94.4%, considerably higher than the national average of 66.3%. Ninety eight percent, 90.6% and 97.9% of the gross output in the O & DP, ET and R & T subsectors were exported in 1988 respectively.

5.6.2 Value of Gross Output Exported

In value terms the data processing sector exports considerably more than the other two sectors combined. In fact it is almost twice the average even though ET and R & T combined employ 2,500 more. The value of gross output exported was £2.014 billion in data processing compared to £480.4m for telecommunications equipment and £612.5m for radio & television receivors.

Neglecting Metals & Engineering the value of gross output exported in the electronics industry is higher than in every other industry even though in most cases it employs considerably less persons. The only other industry which exports a comparable value is the Foods industry, employing 37,480, over twice that of electronics, exporting to the value of £2.9 billion. In terms of the contribution to total manufacturing exports the electronics industry accounts for 28.1% of gross output exported even though it employs just 8.4% of the manufacturing workforce.

A further example of the extremely important contribution from electronics firms to overseas earnings arises when one considers that 15,205 persons in the industry work for exporting establishments. On average the value of gross output exported per head is £308,400. The comparable figure for manufacturing industry is £63,678 per head.

The data indicates that in terms of value of gross output exported the electronics industry contributes more to the economy than most other industries. Such comparisons, however, must be evaluated carefully since considerable distortions in the interpretation of data may occur through either profit switching transfer pricing or the accountancy practices of multinationals. Another point of importance to note is that these sectors import a considerable proportion of their inputs, again reducing their true economic impact.

The occurrence of transfer pricing would artificially raise the value of gross output, thus leading to a wrongful evaluation of the contribution to the economy. The nature and possible degree of transfer pricing will be discussed in more detail in Chapter Six.

It is not possible to discuss the trends of exportation in the electronics industry over any significant period since data relating to the value of gross output exported is unavailable for ET and R & T, except in 1988. Such data is available for data processing but only over the period 1986 to '88. This data, while not available for R & T and ET, is available for Electrical Engineering over the period 1986-'88.

Since R & T and ET account for 50% of the numbers employed in EE analysis of the data over the period will give some indication of the trends of exportation. It may be assumed that because of the small size of the indigenous market given that the products are technologically higher the average percentage exported in ET and R & T will be slightly greater than the average for Electrical Engineering.

Table 5.6.2.1 below illustrates the changing pattern of gross output exported in O & DP, EE and total manufacturing from 1986 to '88. Data is also included for telecommunications equipment and radio & television for 1988.

TABLE 5.6.2.1

GROSS OUTPUT AND PERCENTAGE EXPORTED IN 0 & DP, EE, & MANUFACTURING; 1986-1988, ET and R & T; 1988[189]				
Year	*Industry*	*Gross Output (£ Mil)*	*Exported Gross Output (£ Mil)*	*Exports as % of Gross Output*
1986	O & DP	1,636.3	1,605.2	98.1
1986	EE	932.9	812.1	87.0
1986	All Man	14,342.7	7878.5	54.9
1987	O & DP	1,772.6	1,736.4	98.0
1987	EE	1,206.1	1,080.2	90.0
1987	All Man	15,391.4	9,147.1	59.0
1988	O & DP	2,064.5	2,014.7	97.6
1988	EE	1,630.5	1,478.0	90.6
1988	ET	529.9	480.4	90.6
1988	R & T	655.7	612.5	97.9
1988	All Man	17,375.7	11,049.3	63.6

Through the period 1986 to 1988 the proportion of goods exported in O & DP and EE remained relatively constant. Alternatively the figure for manufacturing rose significantly over the period from 54.9% in 1986 to 63.6% in 1988. Census of industrial production data indicates that overseas industry contributed for a very large proportion of this rise.

The percentage exported in O & DP fell very slightly over the period, from 98.1% in 1986 to 97.6% in 1988. The contribution from EE rose from

[189] CIP 1988 & Unpublished CSO Data

87.0% in 1986 to 90.6% in 1988. Once again it must be stressed that while the percentages may give a good indication of relative performances the indicated values, and especially real contributions to the Irish economy, may be distorted through profit manipulation via transfer pricing by overseas firms.

5.6.3 Export Location

The data as outlined above suggests that there has been no major fluctuations, over this short period, in the proportion of goods exported. Ireland is effectively used as an export platform by overseas firms. This section examines the trends and proportion of gross output by location.

Data is available only over the period 1986 to '88 for all manufacturing industries, while it is only available for ET and R & T in 1988. Table 5.6.3.1 below details the export destination of products in both the O & DP and EE sectors for the period of available data, 1986 to 1988.

An average of 81.9% of gross output was exported to the European Community in the electronics industry. The comparable figure for manufacturing industry was 73.9%. In O & DP the percentage exported to the EC fell from 82.0% in 1986 to 76.8% in 1988. Alternatively the figure for EE rose from 78.7% in 1986 to 85.0% in 1988.

Table 5.6.3.1

EXPORT LOCATION BY % FOR O & DP and EE; 1986-1988 ET and R & T; 1988[190]					
Year	*Sector*	*UK*	*Other EC*	*USA*	*Elsewhere*
1986	O & DP	15.3	66.7	5.8	12.2
1986	EE	21.3	57.4	12.0	9.3
1987	O & DP	26.1	53.4	4.6	15.9
1987	EE	19.8	57.9	11.3	11.0
1988	O & DP	25.2	51.6	5.9	17.3
1988	EE	23.6	61.4	8.6	6.3
1988	ET	23.2	58.3	9.5	9.0
1988	R & T	17.6	69.7	8.1	4.6

A feature of the data is that the electronics sectors show a reliance on the mainland European market rather than the traditional UK market. This is in part a reflection of US firms exporting to affiliates abroad, because of their vertical integration, or penetrating the European market directly from the Irish subsidiary. In the O & DP sector, however, there has been a rise of 9.9% in the quantity exported to the UK over the period compared with a drop of 15.1% exported to other EC countries.

The EE sector has shown an increased reliance on both markets; with 21.3% and 57.4% of gross output exported to the UK and other EC countries in 1986 respectively. The corresponding figures for 1988 was

[190] CIP's 1986-'88 & Unpublished CSO Data

23.6% and 61.4% respectively. In 1988 the telecommunications sector yielded comparatively similar export figures to EE with 23.2% and 69.7% of gross output exported to the UK and EC markets respectively.

Alternatively, R & T concentrated more on the mainland European market, with 69.7% exported to 'other-EC' countries and 17.6% to the UK. In all sectors the proportion exported to the US is low particularly in the O & DP sector. Just 5.9% of the total in O & DP was exported to the US in 1988, a marginal rise of 0.1% since 1986. The comparable figure was 9.5% and 8.1% for ET and R & T in 1988 respectively.

In the 'Elsewhere' category the O & DP and EE sectors differed. The percentage exported to these markets rose by 5.1% in the O & DP sector over the period, while the percentage fell by 3.0% for EE.

Though there is insufficient data to detail projected trends it is apparent that the O & DP sector appears to be diversifying slightly away from the mainland European market and into the UK and other non-EC, excluding the US, markets. Alternatively the EE sector appears to be concentrating more on the EC market rather than any outside. (See survey results, Chapter eight)

5.7 Conclusions

The average percentage employment increase in the electronics industry was substantially higher than in manufacturing industry over the period 1983 to '88. Employment increased to over 15,500, or by approximately 185% since 1973. The comparable figure for manufacturing industry was a decline of 10.8% in the numbers employed. Over this period the electronics industry more than doubled its share of total manufacturing employment, rising from 3.2% to 8.4%. The most substantial increase in the numbers employed occurred over the period 1973 to 1980 with the data processing sector exhibiting the highest percentage increase. Average employment increased less significantly over the period 1980-'88 primarily due to recession.

Trends of employment varied between the electronics subsectors. Both data processing and telecommunications equipment exhibited the largest increases in the numbers employed while the numbers engaged in R & T remained relatively constant. The two former sectors employ over 6,000 persons each with the latter employing less than half this amount.

Data indicates that in comparison to the European Community Ireland increased its total share of employment in data processing, over the period 1974 to 1986, while it also exhibited the highest percentage increases in the numbers employed in all three sectors. Unlike Ireland employment in ET and R & T in the EC has generally declined over the period 1981-'87. This

is due to both the direct and indirect effects of Japanese and US competition particularly in the information technology sectors. Employment in Ireland has not been adversely affected since it relies mainly on non-EC investment in these sectors.

The electronics industry, like much of the high technology sectors, is predominantly controlled by overseas firms. In 1988 96%, 72% and 94% of those employed in the O & DP, ET and R & T sectors worked for overseas firms. The comparable figure for manufacturing industry is 44.2%. US owned establishments accounted for much of the overseas employment in the electronics industry, particularly in data processing, where it accounted for over 85% of those employed.

Non-EC firms accounted for over 50% of the total employed in ET, the remaining proportion consisting of 20% from 'other EC' firms and 30% indigenous owned. The R & T sector is also heavily overseas dominated although no data was available to provide an analysis by nationality of ownership. It was deduced that non-EC firms account for a considerable proportion of those employed.

In accordance with initial expectations the electronics industry is heavily export orientated with a considerable proportion exported to the European market. An average of 95% of gross output was exported in 1988. Over eighty percent of this was exported to the EC. Short term analysis indicates

that data processing appeared to be diversifying away from the mainland markets and into the UK and other non-EC markets. Electrical engineering, of which ET and R & T are subsectors, appears to be concentrating more on the EC market.

The value of such exports was over £3 billion, with O & DP accounting for two thirds of this figure. The electronics industry would appear to contribute a significant proportion to export earnings. For example it employs 8.4% of the manufacturing workforce but accounts for just below 30% of gross output exported. While the industry accounts for a very high proportion of gross output exported the real contribution to the economy may be considerably less due to the pricing strategies of the multinationals. As the following Chapter details it would appear that in certain sectors some distortion of the export data probably occurs through profit switching transfer pricing.

CHAPTER SIX

TRANSFER PRICING IN THE IRISH ELECTRONICS INDUSTRY

6.1 Introduction

Chapter three described transfer pricing as providing a means for a firm to place a value on tangible and intangible assets transferred within a firm. Also discussed were the various constraints and incentives for the possible manipulation these prices. The chapter concluded by noting that while there are many forms of pressure both internal and external to the organisation for not engaging in this practice the rewards may be significant.

The possible existence of this abuse is an issue surrounding some of the new technology overseas investment in Ireland. Such examples are the pharmaceuticals and electronics industries. Using data from various sources, while also considering the trends of multinational behaviour, this chapter will examine and determine the possible existence of manipulation of transfer prices in the Irish electronics industry.

If any abuse does occur it is likely to be through the manipulation of profits and centering them in Ireland. Manipulation of transfer prices enables predominantly US owned firms to reduce overall corporate taxes by centralising profits in Ireland and availing of the low rates of corporation tax.

Several indicators may be used to determine the existence of profit switching transfer pricing, unusually high gross/net output per head figures when compared to manufacturing industry in general, similar discrepancies

when comparing the Irish electronics industry to the same sectors abroad, or considerably lower labour costs as a percentage of total costs, thus indicating much higher than usual profit margins.

These indicators will be discussed in the context of the lower corporation tax rates in Ireland compared to most other EC countries, the extremely high export propensity of electronics firms, the degree of local sourcing and finally the current levels of overseas ownership of the industry.

6.2 Evidence for Transfer Pricing in Ireland

Although difficult to prove there is evidence to suggest that the abuse of transfer pricing exists. Empirical work, to be discussed by Foley, Jacobson, Stewart and O'Leary provide evidence that its abuse occurs, predominantly in the newer high technology industries.

The US Internal Revenue Service (IRS) has conducted several investigations relating to the pricing strategies of multinational operations in Ireland. According to it some corporations manipulate their profits by having their Irish subsidiaries pay very little for both imported raw materials, and in the case of the computer/electronics industry, technology which is transferred abroad. This helps increase profits by centering them in a low tax location; for example Ireland has a 10% corporation tax rate compared to a 36% rate in the US.

Stewart also, with specific reference to certain elements of the chemicals and food industries, writes that the import and export prices charged both by the parent and affiliate companies are consistent to switching profits to Ireland.[191] Similar charges were placed upon the Irish subsidiary of the US owned affiliate Bausch and Lomb in Waterford, by the IRS. In light of these observations it is conceivable to believe that the abuse of transfer pricing may occur in the electronics industry.

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[191] Stewart, 1989, p40-56

US tax authorities have further noted that Irish subsidiaries of US multinationals perform, even in the case of the high technology electronics industry, simple manufacturing operations and basic assembly resulting in little or no managerial or technological expertise contributed in Ireland. They comment that it is conceivable therefore that such firms should be "...entitled only to a normal return, reflecting the low to moderate risk of the operation rather than the extremely high returns to which they have been accustomed".[192] This does not appear to occur. In fact, the opposite appears to happen.

As previously discussed the problem in identifying the degree of transfer pricing is related to the lack of available evidence. This is not to say that authorities are unaware of its existence. NESC, in the early 1980's, has previously associated the degree of intra firm trade by multinationals and EPTR with profit centering.

According to it, in the years preceding the introduction of the 10% corporation tax, "The prevalence of intra-firm trade has also led to a recognition of the opportunities by EPTR to maximise untaxed profits of the company as a whole by means intra-firm pricing policies which maximise the exported profits of the Irish branch rather than other branches of the firm located elsewhere".[193] The report further comments that "...while

[192] Ernst & Young, 1991, p64
[193] NESC, 1980, p38

there is no direct evidence available in Ireland on this practice known as transfer pricing, it would be further surprising, if it does not occur quite commonly".[194] The discussion concludes by noting that while "...EPTR is clearly an important incentive (for overseas investment) it could not explain the high pre-tax profitability of foreign enterprises, except to the extent that transfer pricing is practised".[195] Evidence to support this view is very difficult to ascertain. By analysis of various economic indicators and considering the current tax regime and government policy in Ireland it may be possible to infer its existence. Three criteria have been established to infer the probable existence of pstp.

(1) Firstly the overseas sector must exhibit a high import/export propensity; thus giving firms the capacity to manipulate prices.

(2) Overseas firms showing the above must have a much higher net output per person engaged than indigenous firms in the same sector. This neglects the productivity differential between overseas and indigenous firms. However, if the differences are significant further investigation is warranted.

(3) Where the value added in Ireland in the sectors in question is significantly greater than in similar sectors in the EC it may give an indication of possibility of profit switching transfer pricing.

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[194] NESC, 1980, p38
[195] NESC, 1980, p39

6.3 Data Evidence for Transfer Pricing

Chapter two indicated that one of the most important ownership specific advantages possessed by a multinational firm is its ability to create an internal market for both goods and services. In fact the ability to form an internal market has been cited as the primary reason for multinational formation. Cost minimisation through the sale of raw materials on this internal market is considered as providing firms with an immediate advantage over its indigenous rivals. It also provides the lucrative advantage of manipulation of prices.

For profit switching transfer pricing (PSTP) to occur in the electronics industry, and indeed in any overseas firm operating in Ireland, goods are imported from the parent firm at lower than free market costs and sold at artificially inflated prices to another subsidiary or distributor.

Although outdated it is useful to comment on the study of grant aided industry by Dermot McAleese in the mid-1970's.[196] His report provides an indication of the degree of intra-firm trading among the new export orientated multinationals.

Over half of the output of subsidiaries in Ireland was exported to affiliate companies abroad. Furthermore, only one quarter of new overseas firms did

[196] McAleese, 1977

not sell any output to an affiliate company. It is unlikely that these levels of intra-firm trading by US firms would have reduced significantly since the mid '70's. Given that electronics firms in general strive to achieve high degrees of vertical integration it is more likely to assume that intra-firm trade will be as high, if not higher.

Chapter five indicated that electronics firms, particularly O & DP and R & T, show very high export ratios. In fact the industry accounts for just under a third of total manufacturing gross output exported. If these high export figures are complemented by equally high import ratios then it gives an indication that the predominantly overseas owned industry has the capacity to manipulate profits by under/over charging associated affiliates. This allows firms to artificially inflate prices to affiliates, consequently centering profits in Ireland.

Data available from the CIP allows an analysis of the import content of the electronics industry to be made. Table 6.3.1 below details the usage of Irish produced materials classified by broad industrial sector for the year 1988. Unfortunately data is unavailable to allow a comparison to be made between indigenous and overseas firms. However, since the three electronics sectors in question are predominantly owned by overseas interests it can be assumed that the data is applicable to overseas subsidiaries without large distortions.

Table 6.3.1

USAGE OF IRISH PRODUCED MATERIALS CLASSIFIED BY BROAD INDUSTRIAL SECTOR; 1988[197]	
NACE	*% Irish Produced*
24	39.3
25-26	23.6
22,31-37	18.9
33	***12.9***
344	***12.3***
345	***41.3***
411-423	90.3
424-429	71.3
43	21.2
44-45	37.4
46	49.5
47	20.9
471-472	19.5
473-474	22.1
14,48-49	17.6
Total all Manuf-acturing	53.0

Chapter five indicated that overseas firms employed more than 50% of employees in seven of the twelve industrial sectors. The data above indicates that all of these, except the Drink and Tobacco industry sourced less than 25% of their raw materials in Ireland. Such low degrees of local

[197] CIP 1988 & Unpublished CSO data

sourcing results in their contribution to the economy, in real terms, being lower than export figures would suggest. High technology industries, such as Chemicals, which are heavily dominated by overseas interests, sourced 23.6% of their raw materials locally. The comparable figure for Metals and Engineering, of which electronics is a subsector, is 18.9%, slightly above Miscellaneous industries (the lowest) at 17.6%.

In the electronics subsectors the average percentage of materials used which is Irish produced is slightly higher, 22.2%. For O & DP and ET the figure was 12.9% and 12.3% respectively, considerably lower than that for R & T, which was 41.3%. It would appear that the latter sector does not fit at least one of the criterion for transfer pricing to occur. That is the degree of local sourcing appears to be high, though it is lower than the average of 53% for total manufacturing.

O & DP and ET rank among the lowest of all sectors, and subsectors, for indigenous raw material sourcing. Out of all industries and corresponding subsectors only two subsectors, 'Manufacture of Other Means of Transport' and 'Other Manufacturing Industries' sourced less than the two former electronics sectors; with 10.4% and 6.8% sourced locally in these respectively. Indigenous firms, through their concentration in the more traditional industries, source locally to a much greater extent. Of the five industries in which more than 50% employed work for an indigenous firm one, the Paper and Paper Products industry sources 20.9% in Ireland, the lowest in this

category. The Leather & Clothing, the Manufacture of Non-Metallic Mineral Products and the Timber & Wooden Furniture industries follow with 37.4%, 39.3% and 49.5% respectively. As expected the foods industry sources locally the highest of all industries, with a figure of 90.3% achieved.

High import/export ratio's by multinationals are not alone evidence for the possible occurrence of profit switching transfer pricing. Chapter four indicated that the primary motivation for overseas firms, particularly those from the US, for establishing in Ireland was to supply the European market.

The expectation is that the export ratios will correspondingly be high. With regard to the high import content chapters two & three indicated that internalisation of the market for raw materials and the very limited degree of linkage formation is a characteristic of multinationals operating in high technology sectors. It is expected that the import content will also be high.

The consequence of these assertions is that the high import/export propensity is not proof of the existence of transfer pricing. Nevertheless they fulfil some of the criterion for it to occur. The discussion thus far would seem to confirm that some overseas firms, particularly those operating in the new high technology sectors, fit the criterion necessary for enabling the manipulation of transfer prices to occur.

6.4 Net Output/Head in Indigenous & Overseas Firms

If pstp does occur in certain industrial sectors then it will artificially increase the net output per head of those overseas sectors and result in differences, expected to be significant, when compared with indigenous firms in the same sector.

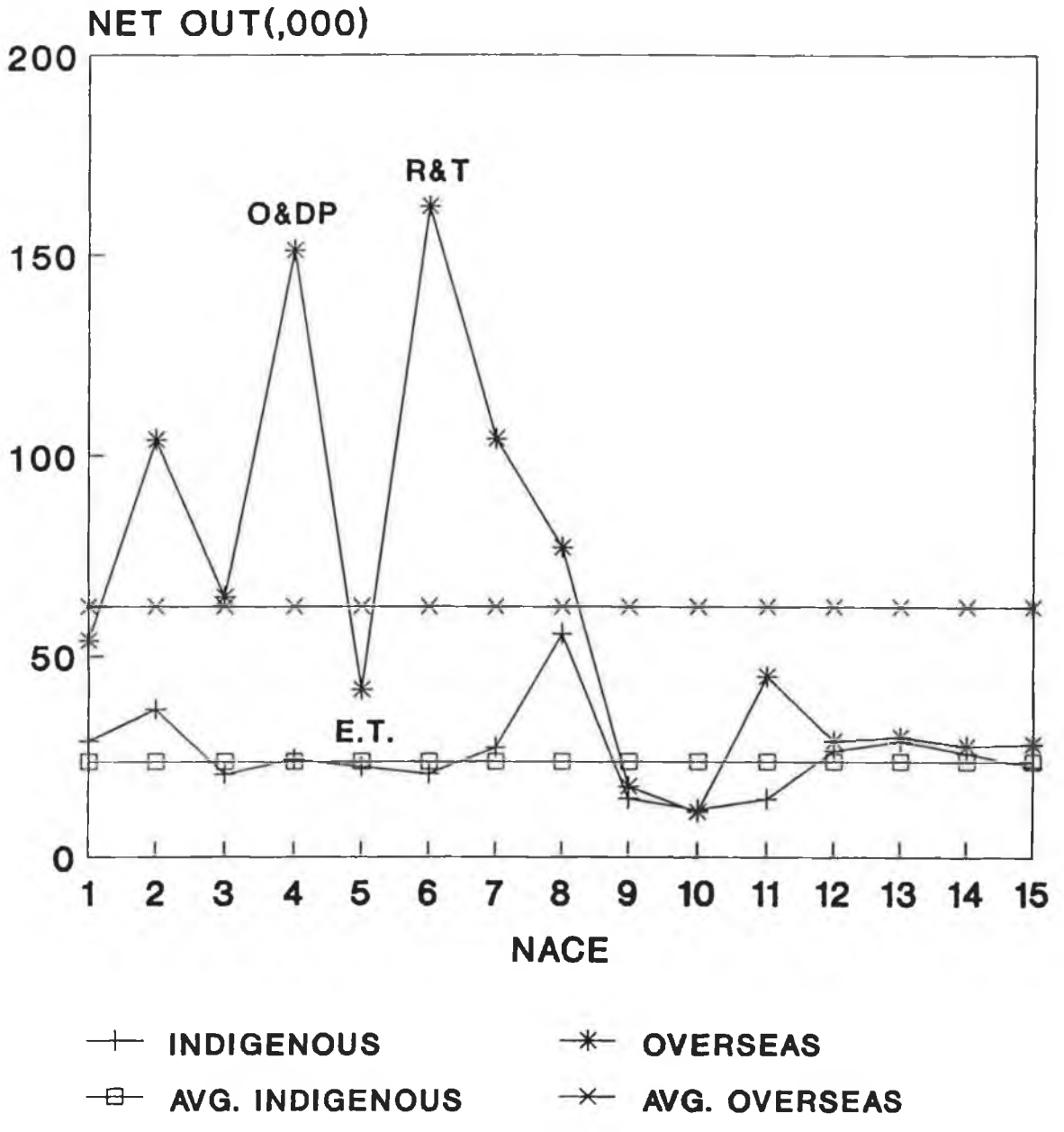
This method, however, does not take into account those differences in productivity or resources available between indigenous and overseas firms which may result in the latter having a higher net outputs, leaving aside transfer pricing. Nevertheless this analysis is useful for examining the sectors where profit switching transfer pricing may occur.

Graph 6.4.1 below provides a comparison of the net output per person engaged (NOH) for both indigenous and overseas firms for the year 1988. Data was derived from the Census of Industrial Production 1988. The most significant characteristic of the graph is that the NOH is higher in each overseas industry sector, excepting the Clothing & Footwear industry, where the NOH for indigenous industry is only slightly higher than that for overseas firms.

For all manufacturing industry, the NOH by overseas firms is over twice that for indigenous firms; £23,600 for the latter against £62,400 per head for the former. The differences in NOH are considerably larger in the overseas high technology dominated industries.

Graph 6.4.1

Net Output per Person Engaged
Indigenous & Overseas Industry;1988



See Chapter 5 for NACE classifications

In the Chemicals industry, for example, the net output per person engaged in indigenous firms is £36,700. The comparable figure for overseas firms was £103,900, or 283.1% larger. In the more traditional, but nevertheless overseas dominated, Foods industry the ratio of NOH for indigenous & overseas firms is roughly 1:4, or a NOH of £27,200 for the former and £104,200 for the latter.

The average NOH in the overseas electronics sectors is considerably greater than both the average for manufacturing and overseas firms in general. In the O & DP sector, for example, the figure was £151,200 for overseas firms or over six times that for indigenous firms in the same sector. Indigenous net output per head in this sector was only slightly above the national average being £24,300 compared with £23,600.

Similarly a very high ratio of overseas/indigenous NOH occurred in the R & T sector, £20,700 and £162,200 for indigenous and overseas firms respectively. Indigenous net output per head was slightly less than the national average. This is not unexpected since indigenous firms operating in this sector employ, on average, 10.7 persons per establishment compared with 133.4 for overseas firms in the same sector. In comparison indigenous manufacturing firms employ 26.6 persons, twice that of indigenous firms in R & T. It is therefore expected that these smaller indigenous firms will have lower productivity levels.

A higher NOH between overseas and indigenous firms was also evident in the equipment for telecommunications sector, though the difference was not quite as substantial as in the other two electronics sectors. Overseas NOH per person was £41,700 against an indigenous figure of £22,300.

Indigenous NOH was comparable to the average for indigenous manufacturing industry while the average net output per head of overseas firms in this sector, twice that for indigenous firms, was just two-thirds that of the average for overseas manufacturing firms. This sector does not exhibit the considerable variations in net output per head which are in evidence for both O & DP and R & T and would seem to infer that pstp does not occur to any significant degree.

6.5 Interpretation of the Results

Apart from considering that overseas firms are very much more productive than their indigenous counterparts it is difficult to provide an explanation for the very great variations in NOH in the newer overseas industry, particularly in the data processing and pharmaceuticals sectors. Data presented below would indicate, however, that in general overseas firms are more profitable than their indigenous counterparts. Table 6.5.1 details a comparison of the profit before tax as a percentage of sales in both indigenous and overseas firms through the period 1984-1988.

Table 6.5.1

Profits as a % of sales for indigenous and overseas Manufacturing firms; 1984-1988[198]

	1984	1985	1986	1987	1988
Irish Owned	2.1%	2.0%	2.4%	3.1%	3.9%
Overseas Owned	21.8%	21.4%	23.3%	24.1%	23.9%

The data indicates a considerably higher profit ratio for overseas firms. In both cases there has been an upward trend in pre-tax profitability with overseas firms generating considerably higher returns than their indigenous counterparts. In 1988, for example, pre-tax profits as a percentage of sales for overseas firms was 23.9% The comparable figure for indigenous industry was 3.9%.

[198] Department of Industry and Commerce, 1990, Section 3.31

Such relatively high profit levels obtained by overseas industry may indicate transfer pricing but it could also be a representation of the higher productivity of overseas multinationals through their greater specialisation in the more profitable high technology sectors or by virtue of their greater size; for example in 1988 indigenous firms employ on average 26.6 persons compared with 99.3 for overseas firms.[199] This may in part explain the net output per head differentials.

O 'Leary comments, however, that analysis of "...available investment data by sector does not lend support to the hypothesis that such productivity differentials can be explained on the basis of the amount of capital employed. In other words, the high levels of apparent value added per employee in sectors such as chemicals and electronics are not explicable in terms of capital intensiveness. Nor are they explicable in terms of the skill content of employment provided by these sectors in Ireland, as evidenced by the average wage and salary levels..."[200]

Capital intensiveness and so on as a key element in explaining the variations in NOH between indigenous and overseas firms is ruled out by the author. He does, however, provide three probable explanations for the high value added per employee;

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[199] CIP 1988
[200] O'Leary, September 1984, p29

(1) "That the output price at which output is produced in, and largely exported from Ireland by multinationals incorporates a significant element which represents amortisation of research and development and related activities conducted outside Ireland;

(2) That the price of output reflects in part the remuneration of current services such as administration, distribution and marketing carried out by MNE's headquarters or other subsidiaries and charged implicitly to the Irish operation.

(3) That, in some circumstances, MNE's exports from Ireland are invoiced at artificially high prices and their import of components are invoiced at artificially low prices ".[201]

Points one and two are comparatively similar in that they both account for payments for the complete business activities carried out by multinationals. Multinationals which have invested in the electronics industry in Ireland generally have not located the key elements of their business functions in Ireland. Therefore the predominantly US owned subsidiaries must pay for R & D and marketing expenses and so on which were carried out in the home country. Such payments may be used, in effect, for profit repatriation.

Previous discussions, however, have commented that according to the US Internal Revenue Service Irish subsidiaries generally do not make these payments. In fact parent firms are under charging affiliates. If we are to follow this analogy then it would be true to disregard points one and two

[201] O'Leary, September, p27 & 29

and use point three for explaining the large net output figures. Effectively this implies accepting that profit switching transfer pricing occurs.

Foley, for 1983-'84, has analysed the Gross Value Added (GVA) in the O & DP and Pharmaceuticals industries. As a basis for determining the existence of transfer pricing he writes "If transfer pricing was not operated and if foreign firms net output included full payments for R & D, royalties etc and marketing one could reasonably expect a close relationship between net output per head in Ireland's foreign plants and firms in the same industry in other countries which would not be characterised by the branch plant feature".[202]

If it is to accepted that abuse of transfer pricing occurs in Ireland and not in other EC countries then it can be assumed that if a comparison is made of the GVA per person employed in the predominantly overseas owned O & DP, ET and R & T sectors to the same sectors abroad the Irish figure would be unaccountably higher than the EC average.

Two mechanisms to determine the possible existence of profit switching transfer pricing are used. The first has been briefly discussed above. The second is based upon the principle that labour costs as a percentage of Gross Value Added should be broadly similar in all EC countries, when taking differences in average earnings into account. This argument pre-

[202] Foley, December 1988, p14

supposes that if transfer pricing occurs, for example in Ireland, then labour costs as a percentage of GVA will be much lower for reasons of much higher profits.

Using EC data for the gross value added per person engaged at factor costs for Ireland and the rest of the EC one would expect if transfer pricing does not occur, relatively similar trends in the electronics sectors. This analysis is based on the exclusion of two points. Firstly it does not take into account the effects of the production of much higher value added products, high powered mainframe computer systems for example, in the Irish computer industry than in the EC. Given the importance of computers for military applications, however, it is unlikely that countries such as Germany, Italy and so on would not be producing such devices.

The second point is that it also neglects the existence of a possible much higher levels of productivity among overseas firms. This has previously been discussed, see O'Leary, and disregarded as a possible explanation.

Tables 6.5.2, 6.5.3 and 6.5.4 and the corresponding graphs 6.5.1 (a) & (b), 6.5.2 and 6.5.3 indicate, where available, the GVA per person engaged in O & DP, ET and R & T in various EC countries respectively. Similarly tables 6.5.5, 6.5.6 and 6.5.7, with the corresponding graphs, indicate labour costs as a percentage of value added in each country. Data was available for O & DP from 1979-'87 in eight EC countries while available

in selected countries only for ET and R & T from 1981-'87. All data was derived from Eurostat, 'Structure and Activity of Industry', Various Issues.

Gross Value Added has been calculated as the

Production Value - Intermediate Consumption

Production Value = (a) + (b) + (c) + (d) - (e) and

(a) Total turnover
(b) Capital assets manufactured by firms for own use
(c) Manufactured goods & work in progress
(d) Goods for resale without processing
(e) Purchases of goods for resale without processing

Intermediate Consumption = (f) + (g) + (h) - (i), where

(f) Purchases of materials & fuel
(g) Cost of industrial services
(h) Cost of non-Industrial services
(i) Materials & fuel

Gross Value Added = (a) + (b) + (c) + (d) + (i)
-(f) - (g) - (h) - (e)

Table 6.5.2

GROSS VALUE ADDED PER PERSON ENGAGED, O & DP; 1979-'87 ('000 ECU)							
Year	*Denm-ark*	*Germ-any*	*Fra-nce*	*Irel-and*	*Italy*	*Neth.*	*UK*
1979	30.2	36.6	38.9	12.7	55.5	13.3	-
1980	31.3	38.1	-	12.7	-	16.8	-
1981	-	66.7	89.2	152.2	33.0	-	30.0
1982	-	84.9	101.0	-	84.1	-	37.3
1983	10.1	46.3	48.7	129.4	52.1	-	23.1
1984	11.8	51.3	-	87.3	58.9	46.3	28.1
1985	29.1	54.3	70.5	85.1	54.5	28.3	34.0
1986	33.3	55.6	88.7	137.6	-	54.3	56.4
1987	28.9	-	103.8	166.3	106.3	-	65.5

Table 6.5.3

GROSS VALUE ADDED PER PERSON ENGAGED, ET; 1981-'87 ('000 ECU)					
Year	*Germ-any*	*France*	*Irel-and*	*Italy*	*UK*
1981	38.3	47.6	58.0	31.1	37.6
1982	43.7	53.8	-	40.3	42.8
1983	29.9	25.9	30.8	25.1	23.3
1984	31.2	-	45.3	26.3	25.9
1985	32.9	31.1	36.0	31.4	28.0
1986	-	34.2	32.4	-	25.0
1987	-	39.6	34.4	35.9	25.4

Table 6.5.4

GROSS VALUE ADDED PER PERSON ENGAGED, R & T; 1981-'87 ('000 ECU)					
Year	*Germ-any*	*France*	*Irel-and*	*Italy*	*UK*
1981	46.3	56.0	34.2	40.4	43.2
1982	53.7	60.3	40.0	51.7	50.3
1983	22.8	25.7	19.2	23.1	22.7
1984	23.8	-	27.6	28.2	27.0
1985	24.6	33.6	35.6	28.6	26.7
1986	-	37.0	30.6	33.5	22.4
1987	-	37.6	38.4	36.5	25.2

Table 6.5.5

LABOUR COSTS AS A PERCENTAGE OF GROSS VALUE ADDED, O & DP; 1979-'87							
Year	*Denm-ark*	*Germ-any*	*Fra-nce*	*Irel-and*	*Italy*	*Neth.*	*UK*
1979	-	70.1	71.4	28.1	69.1	-	40.0
1980	-	72.3	70.2	-	61.6	-	42.7
1981	-	36.7	32.2	8.3	28.7	-	26.5
1982	-	33.5	30.4	-	23.5	-	21.4
1983	99.1	69.4	61.5	12.6	41.8	-	39.4
1984	83.4	71.4	-	17.3	41.5	47.2	37.8
1985	84.6	71.1	54.1	17.1	42.6	79.3	39.0
1986	-	74.0	54.6	15.6	-	58.3	35.1
1987	28.9	-	54.8	13.5	47.0	-	31.1

Table 6.5.6

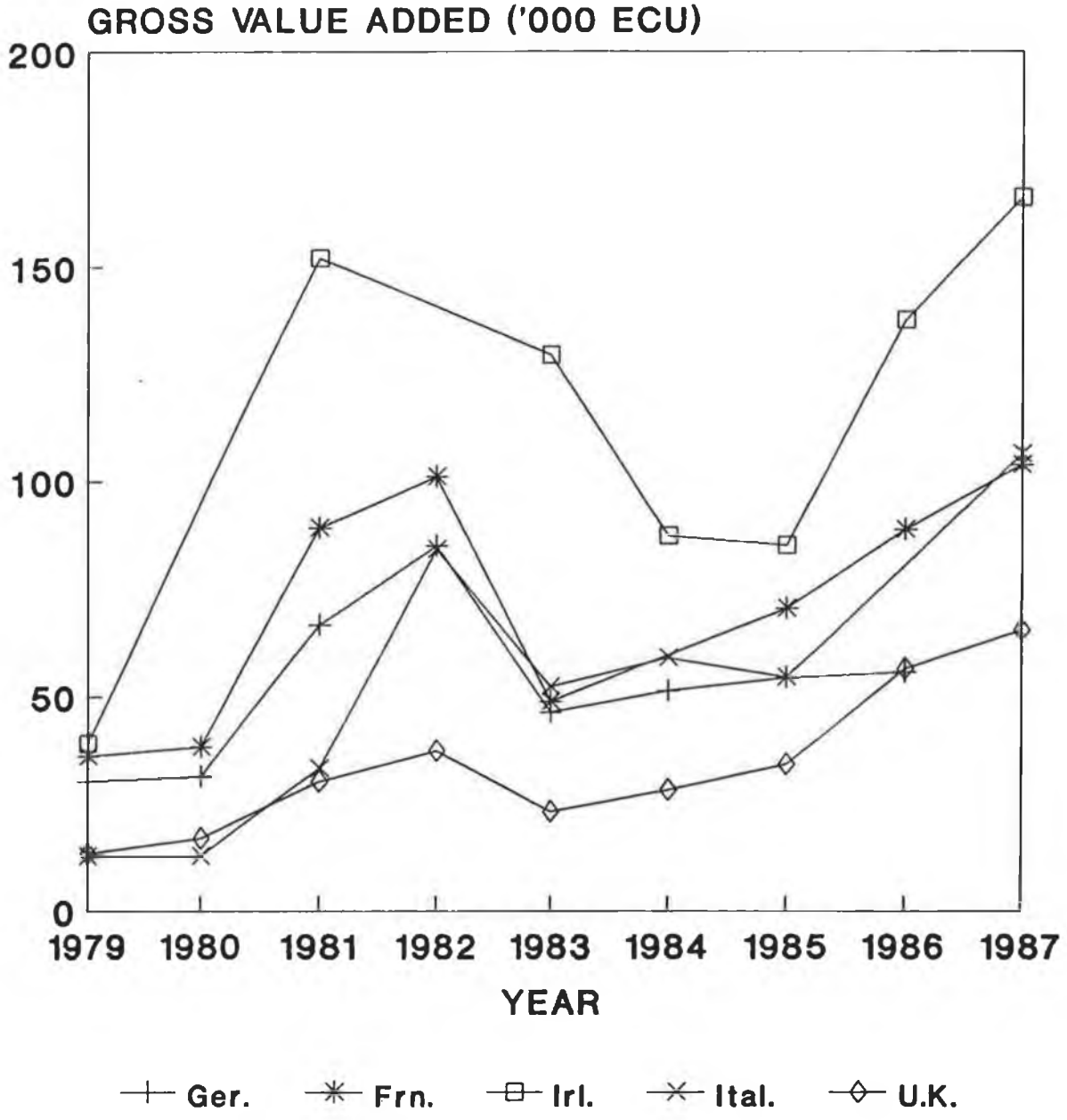
LABOUR COSTS AS A PERCENTAGE OF GROSS VALUE ADDED, ET; 1981-'87					
Year	*Germ-any*	*France*	*Irel-and*	*Italy*	*UK*
1981	18.7	18.6	9.8	12.6	13.1
1982	22.1	20.0	-	14.9	14.3
1983	24.7	21.5	12.8	17.3	14.6
1984	24.6	-	13.2	16.1	16.2
1985	25.4	24.1	15.7	20.7	17.5
1986	-	28.2	16.5	-	16.4
1987	-	31.7	17.0	23.4	17.1

Table 6.5.7

LABOUR COSTS AS A PERCENTAGE OF GROSS VALUE ADDED, R & T; 1981-'87					
Year	*Germ-any*	*France*	*Irel-and*	*Italy*	*UK*
1981	34.8	34.1	27.9	32.1	27.6
1982	32.9	34.2	-	28.3	26.5
1983	85.3	83.4	64.3	71.2	60.4
1984	84.5	-	48.9	66.1	55.0
1985	84.7	75.2	65.9	69.4	59.9
1986	-	74.1	49.1	68.9	65.7
1987	-	74.3	41.7	69.5	60.1

Graph 6.5.1 (a)

GVA Per Person Engaged in EC Countries, O & DP; 1979-'87



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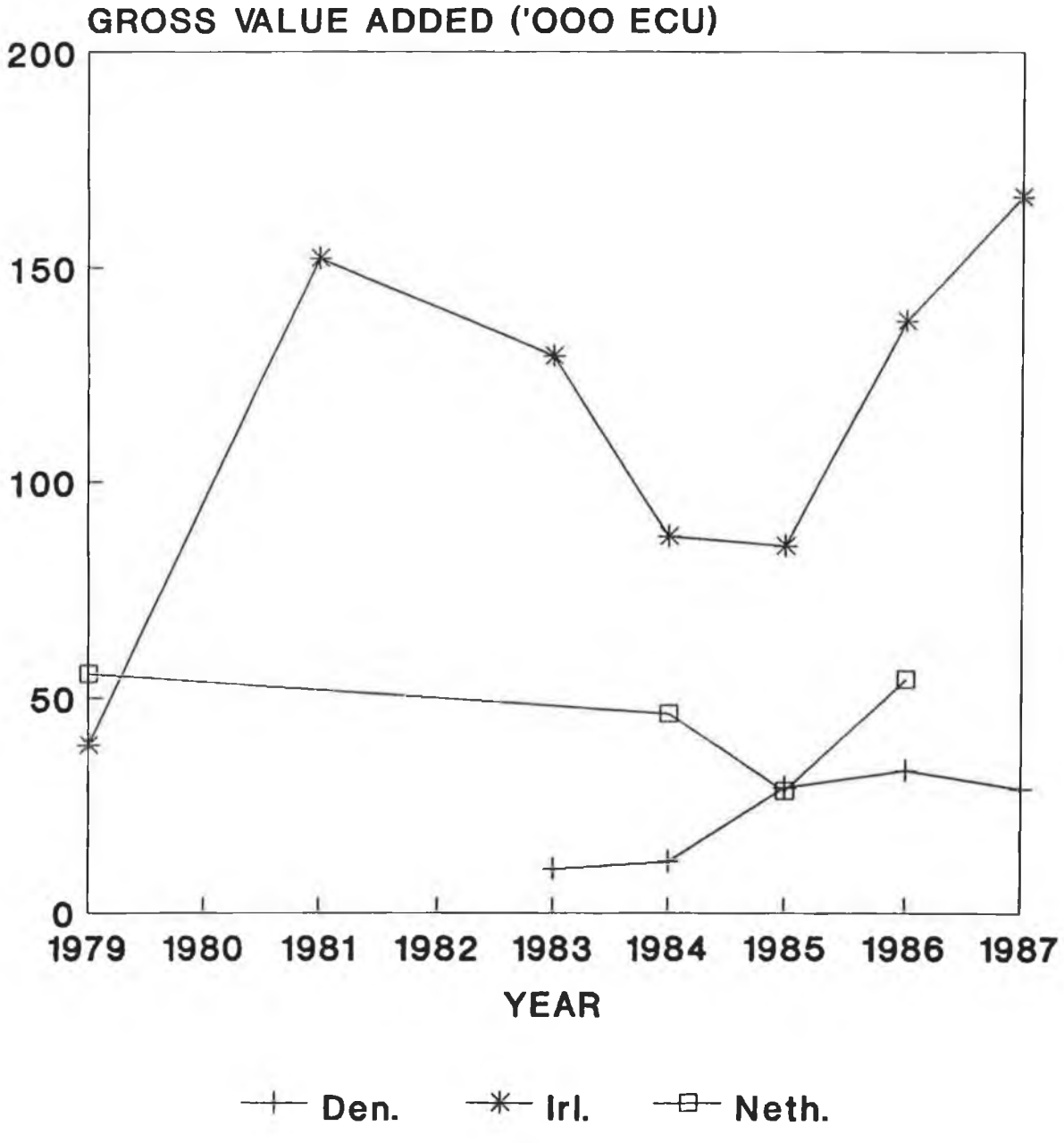
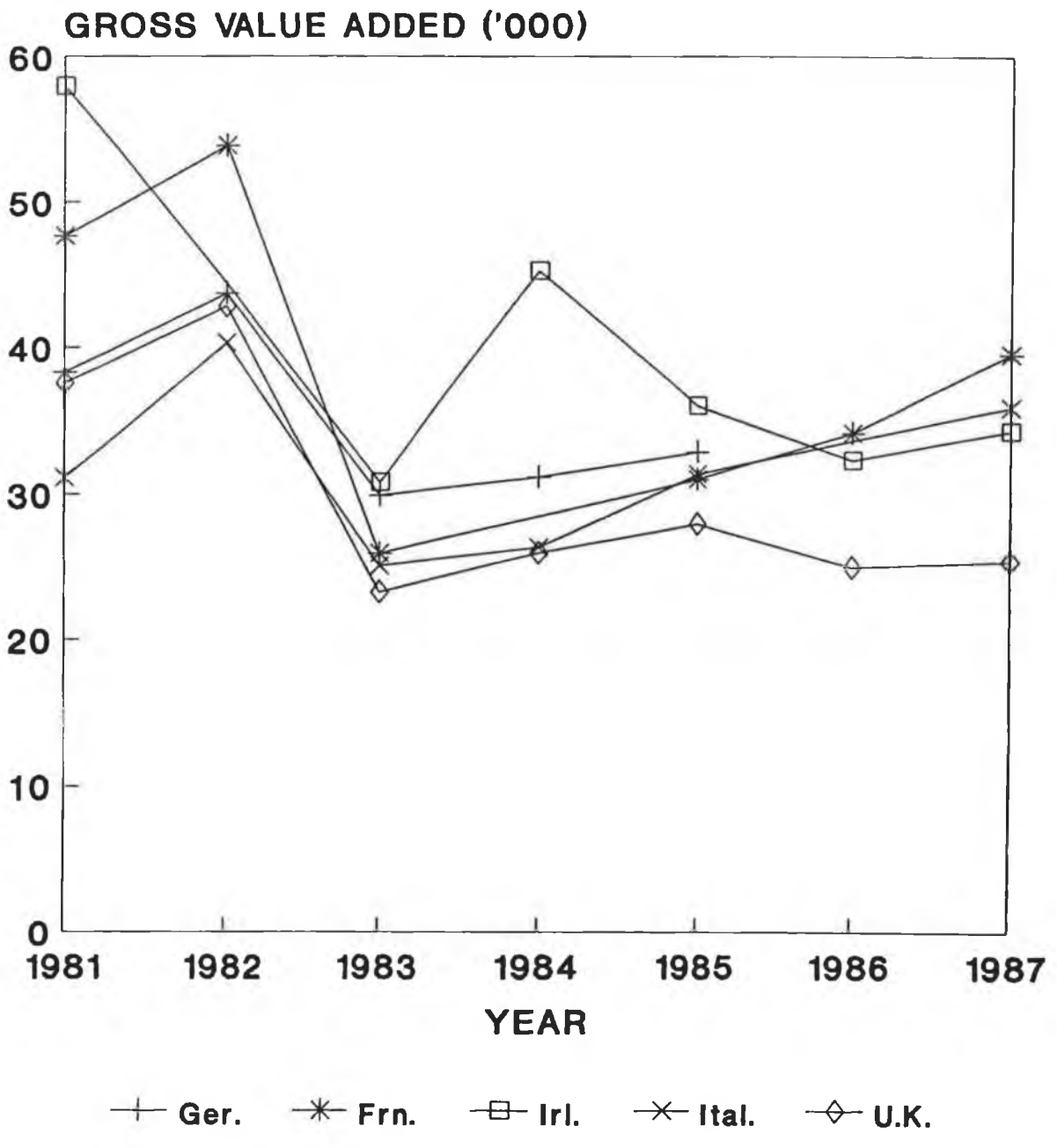
Graph 6.5.1 (b)

GVA Per Person Engaged in EC Countries, O & DP; 1979-'87

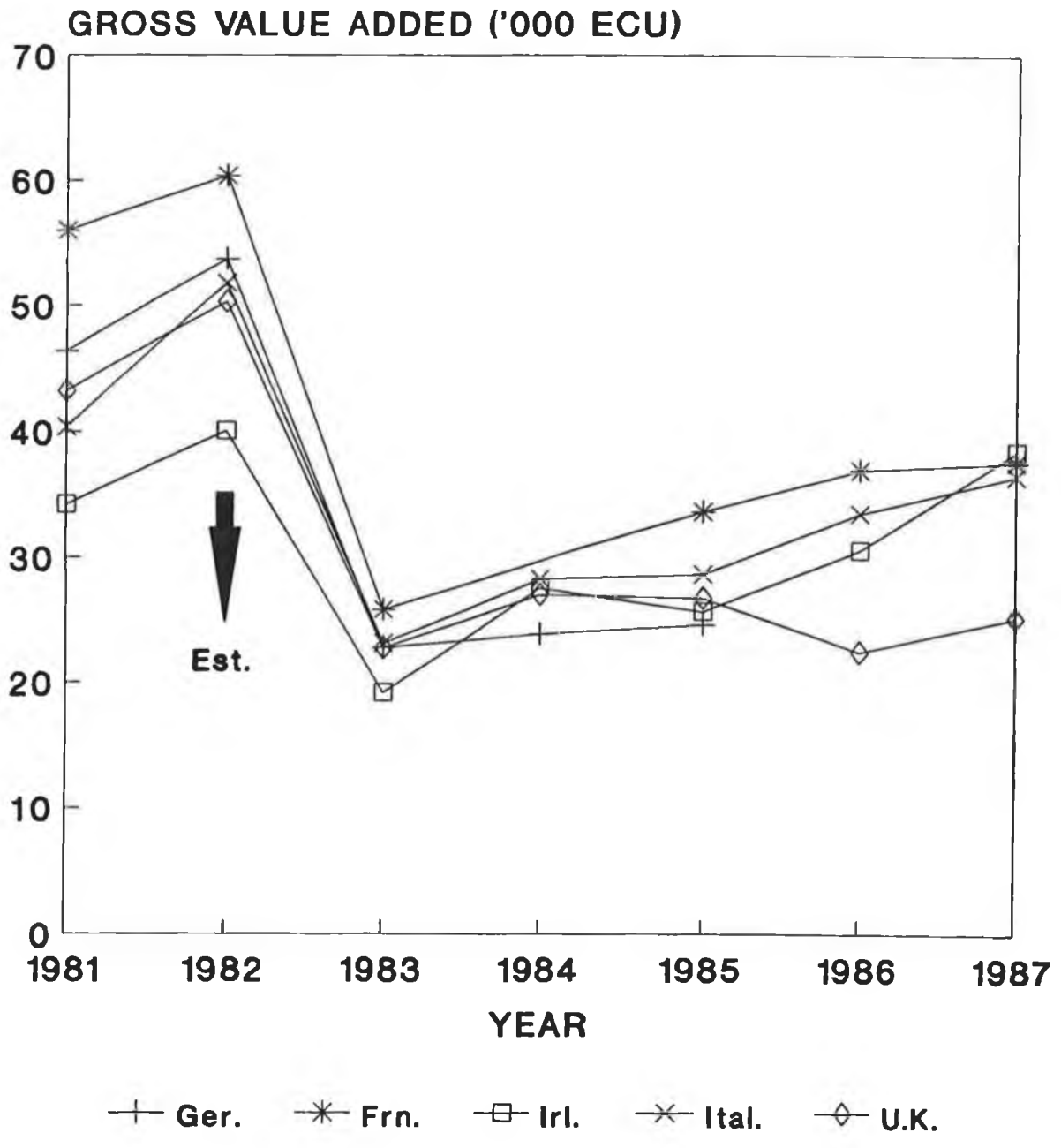


Graph 6.5.2
GVA Per Person Engaged in EC Countries, ET; 1981-'87



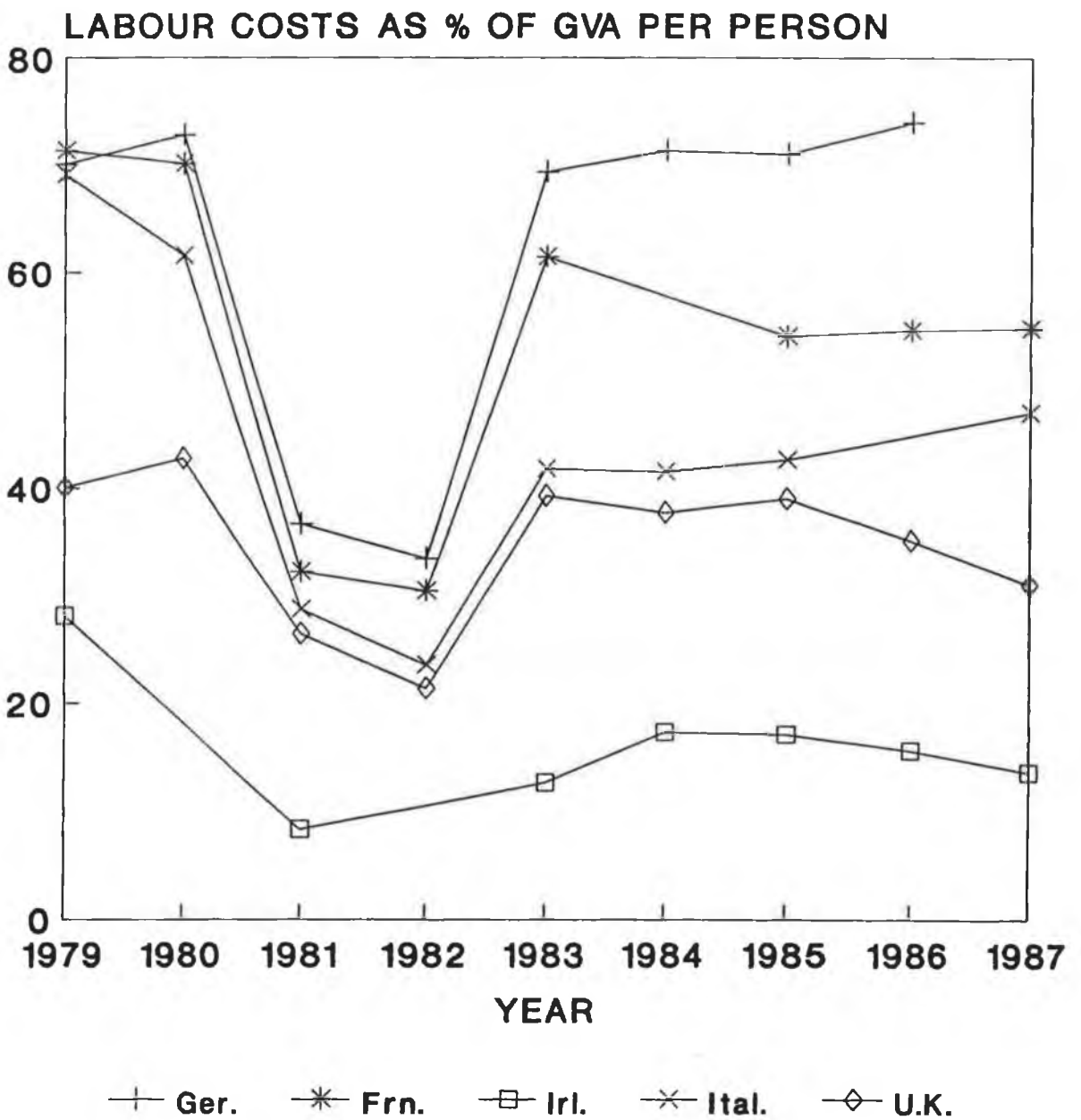
Graph 6.5.3

GVA Per Person Engaged in EC Countries, R & T; 1981-'87



Graph 6.5.4 (a)

Labour Costs as a % of GVA Per Person Engaged in EC Countries, O & DP;1979-'87



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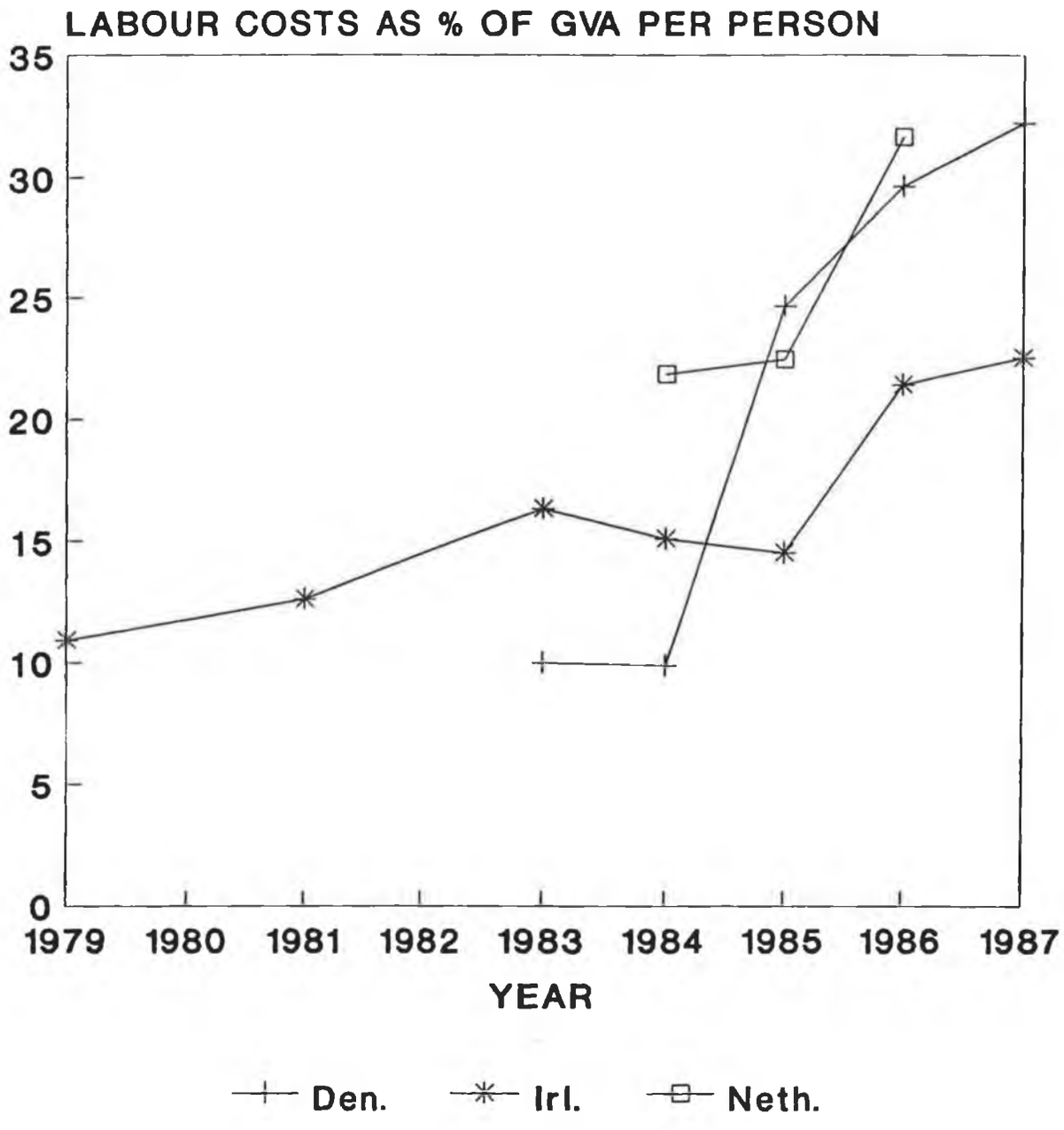
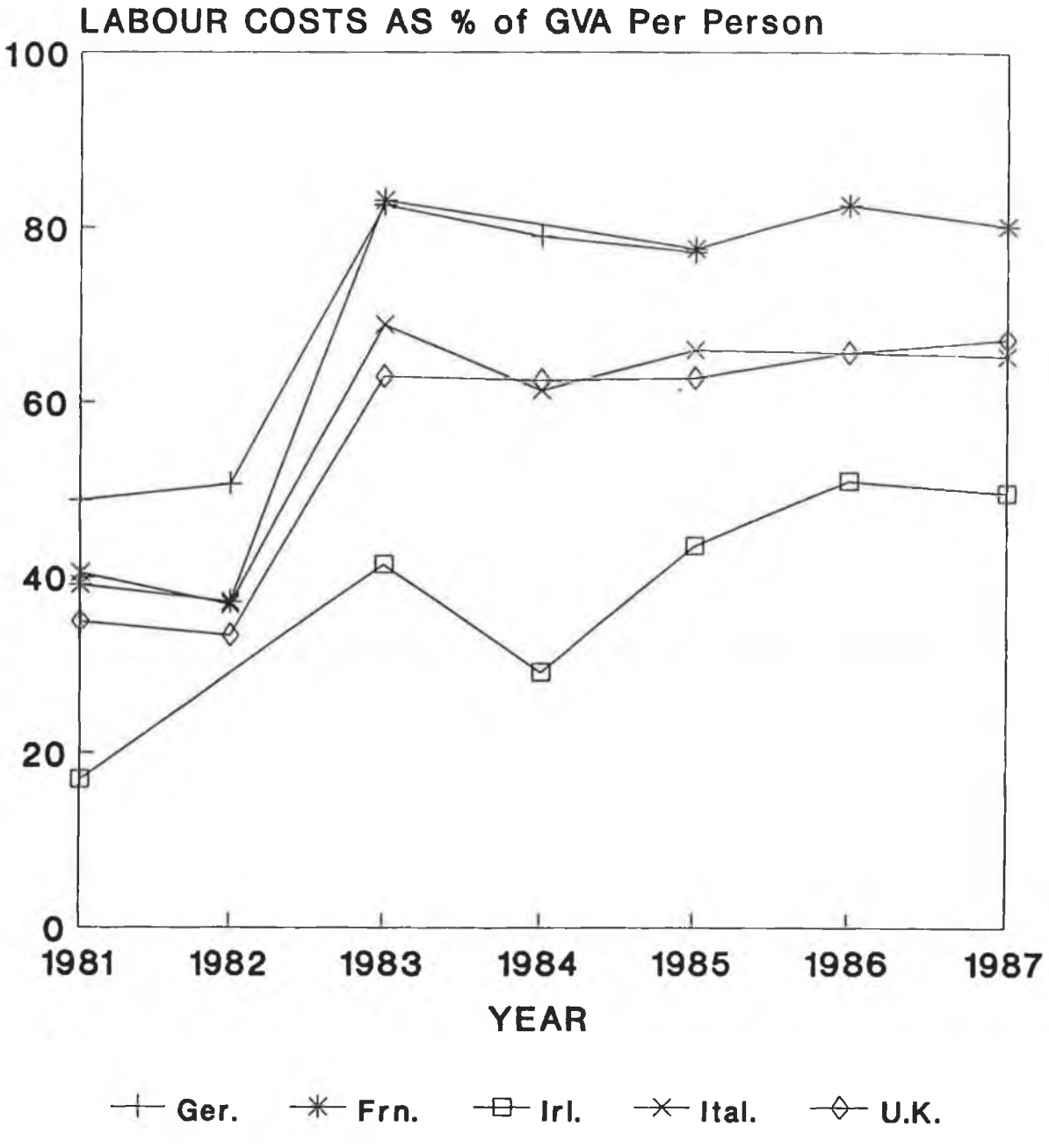
Graph 6.5.4 (b)

Labour Costs as a % of GVA Per Person Engaged in EC Countries, O & DP;1979-'87



Graph 6.5.5

Labour Costs as a % of GVA Per Person Engaged in EC Countries, ET; 1981-'87



Graph 6.5.6

Labour Costs as a % of GVA Per Person Engaged in EC Countries, R & T; 1981-'87

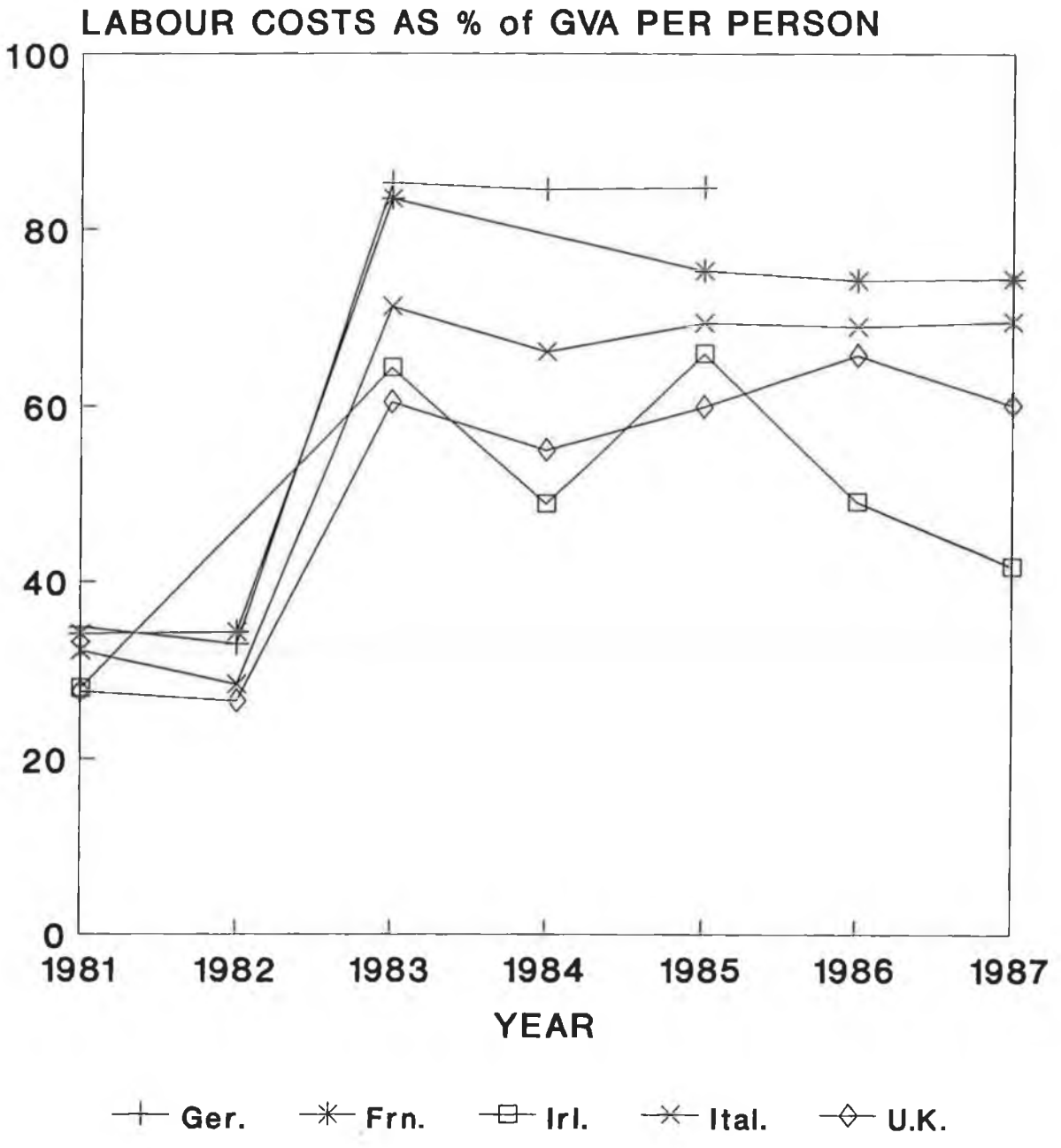


Table 6.5.2 and graph 6.5.1 (a) & (b) above indicate that the Gross Value Added per person (GVA/P) in the Irish data processing industry has risen significantly from 38,900 ECU, in 1979, to 166,300 ECU by 1987. This corresponds to an increase of 427.5%. GVA/P did fall from 129,450 ECU to 85,090 ECU over the period 1983 to '85, however, and may be seen as a reflection of the downward trend, as discussed in chapter five section two, of European demand for data processing equipment. This is also reflected in the downward trend of graph 6.5.4 where labour costs as a percentage of value added are seen to increase significantly over the period.

The above data, and corresponding graphs, indicate that in each successive year from 1979 to '87 the GVA per person was higher in Ireland than in every other EC country. The average GVA per person in Ireland over the period was 113,800 ECU.

The next country with the highest GVA/P was France with 72,000 ECU, or 64% that of Ireland. Ireland's GVA/P was more than twice that of Germany, Italy and the Netherlands, over three times that for the UK and five times the amount for Denmark. The corresponding figures in ECU ('000) were 52.6, 51.8, 46.1, 33.8 and 22.6 respectively.

Ireland's unusual position is further reflected if one compares labour costs as a percentage of value added in each of these countries. If profits are substantially inflated then one would expect that labour costs as a

percentage of value added would be small compared with those in countries where profit manipulation does not occur. This method assumes that the differences in labour costs as a percentage of value added, where profit manipulation is suggested, will be to such a degree that variations in average wage rates will not be enough to compensate for it. In the data processing sector one can again one can see discrepancies in the data.

Table 6.5.5 and graph 6.5.4 indicates that the average labour cost as a percentage of value added per person in the data processing sector is significantly lower in Ireland than in every other EC country. The corresponding figure was 16.1%. This is significantly lower than the next lowest, the UK, with labour costs as a percentage of GVA/P at 34.8%, or over twice that for Ireland.

The figures for the remaining countries were Belgium (42.3%), Italy (44.5%), France (53.6%) the Netherlands (61.6%) and Germany (with 62.4%). Denmark had the highest labour costs as % of GVA/P, primarily due to the low value added nature of the sector, being 89.2%.

The data would suggest that profit switching transfer pricing, even by taking the differences in wage rates into account, has distorted the figures resulting in Ireland having a much lower labour cost as a % of GVA/P. Such large differences in both GVA/P and labour costs as a percentage of GVA between Ireland and the other EC countries have sometimes been

commented as not necessarily reflecting transfer pricing but explainable rather by assuming that overseas firms operating in Ireland are far more efficient than those in other EC countries. Another explanation is that overseas firms produce products which are characterised as extremely high value added.

There is, however, no conclusive evidence to provide an explanation to suggest why multinationals in this sector are substantially more profitable than in similar firms abroad. Given the profit maximising nature of multinationals, the motivation and type of investment (high import/export content and so on) it would appear that there is some form of policy towards the centering of profits in Ireland in this sector. Foley, for example, comments that it is "...hard to find an explanation for this (the significantly higher GVA per person in O & DP and Pharmaceuticals) apart from transfer pricing".[203]

Evidence for the possible existence of transfer price manipulation is not as substantial for the two remaining sectors, equipment for telecommunications and radio & television receivors. Graph 6.4.1 indicated that the net output per head in the former overseas sector was £41,700 or slightly less that twice that for indigenous firms. This was considerably less than the average of £62,400 per head for total manufacturing industry. While ET fits some of the criterion for transfer pricing to occur, that is high import and export

[203] Foley, December 1988, p16

figures, it is unlikely, given the relatively low net output figures, that it occurs to any significant degree.

Table 6.5.3 indicates that the average GVA/P was higher, though only very slightly, in Ireland than in the other EC countries over the period 1981 to '86. The average Irish figure was 39,480 ECU. The comparable figures were 38,170 ECU, 35,210 ECU, 31,690 and 29,710 ECU for France, Germany, Italy and the UK respectively. The data indicates that on average firms operating in the ET sector in Ireland have a value added which is comparable to firms operating in the same sector in the EC.

Labour cost as a % of value added per person in Ireland is 38.6%. This is lower, significantly is some cases, than in each other EC country. This may be seen not as a result of profit manipulation by multinationals, however, but rather as a result of the combined effects of lower average wage rates and a slightly higher value added per person in Ireland. Effectively this means that there is insufficient evidence to prove that profit switching transfer pricing occurs in this sector.

The final electronics subsector is radio & television receivors. The nature of the semiconductor market is such that it is an extremely high value added one. It is expected therefore that the net output per head will be high. The average net output per head for overseas firms is £162,000, comparable to the data processing sector, against £20,700 for indigenous firms. The sector

does not, however, satisfy all the criterion to lead to the expectation that pstp exists. One would expect, that if this form of manipulation of transfer pricing were to occur then the import content would be high.

This does not occur in the R & T sector. Indeed, as section 6.3 noted, over 40% of the inputs used are sourced locally. This removes the possibility for firms to buy goods at lower than average free market prices and enable profit switching to occur.

According to table 6.5.4 and graph 6.5.3, the average GVA/P is less than in each of the other EC countries for which data was available. The average gross value added per person in this sector in Ireland over the period was 29,260 ECU. This compares with 41,710 ECU in France, the highest GVA/P, 34,580 ECU in Italy and 34,250 ECU in Germany. The UK figure was slightly above Ireland with 31,080 ECU per person. By 1987, however, the GVA/P in Ireland, at 38,450 ECU, was comparable to both France and Italy and was higher than that for the UK. Again the evidence of transfer pricing is lacking.

Similarly the analysis of labour costs as a percentage of GVA/P is very similar in Ireland than in the rest of the EC. The figure for Ireland was 51.7% compared with 53.4% for Italy and 56.7% and 64.5% for France and Germany respectively. The comparable figure for the UK was lower, at 45.9%. In summary therefore there is no conclusive evidence for the

existence of profit switching transfer pricing in this sector. Individual firms in this sector may, however, practice profit switching transfer pricing. Indeed it may explain why, on average, the GVA/P is unexpectedly very similar, given the comparatively small size of Irish firms and limited resources devoted to R & D in Ireland than in the rest of the EC.

A common trend within all EC countries is the substantial fall in GVA/P, in both the O & DP and particularly R & T sectors over the early 1980's. Graphs 6.5.1 and 6.5.3 show this most clearly. Indeed average GVA/P dropped by 53% in the former sector in Ireland. This occurred predominantly because of the fall in value of sales due to amongst others, recession in the market and increased competition from the Far East. This was one of the reasons for the slower than expected growth of the electronics industry in Ireland. It was the characteristics of the ET sector that enabled it to avoid much of the impact of recession. (see Chapter five, section two)

6.6 Conclusions

This chapter concludes that profit switching transfer pricing probably occurs in the data processing industry, though its exact value cannot be calculated. Discussions would suggest, however, that this sector is not alone in providing evidence for transfer pricing. Applying similar models to, for example, the pharmaceuticals industry results in similar conclusions.

The direct effects of transfer pricing is to distort the true economic significance of the data processing industry to the economy. It should be noted that the direct costs to the economy from the expected manipulation of profits are negligible. Therefore the usage of profit switching transfer pricing by multinationals may not necessarily run contradictory to government economic policy. Indeed it may result in Ireland obtaining a greater share of taxation revenue than if it did not exist. It also has an added advantage of giving this country an additional country specific advantage which may in fact be responsible for the initial multinational investment decision.

The question of knowing whether or not abuse of transfer pricing exists is important since if multinationals have invested for the purpose of exploiting this tax system the retention of their investments is susceptible to changes in legislations outside of Irish control. That is to say if there is any significant overhaul of particularly US tax legislation whereby the capacity to manipulate profits is removed it could have severe effects on Ireland's

relative country-specific advantages. This could have damaging effects both on present investments, since electronics firms are extremely mobile and consequently can easily scale down operations, and plans for future investment.

Evidence is not so conclusive for pstp in both the equipment for telecommunications and radio & television receivors sectors. However the similar GVA/P figures between Ireland and the EC in these sectors was not expected. This was for reasons of the relatively small size of Irish firms, compared to Europe and the lack of primary research carried out by multinationals which would have the effect of increasing the value added in Ireland. It may be the case that individual firms operating in the ET and the R & T sectors use profit switching transfer pricing. However data to prove this hypothesis remains inconclusive.

CHAPTER SEVEN

RESEARCH METHODOLOGY

7.1 Introduction

This chapter describes the research methodology that was used to conduct the survey of electronics firms in Ireland. Section 7.2 describes in detail the sample design. It describes the forms of bias in a sampling frame and describes how this may be overcome. The various criteria used in the evaluation of sampling frames are introduced. Also described is how the sample population was derived and the various sources used.

Section 7.3 outlines why a postal survey was the preferred choice for sampling the population. It is followed by a discussion of the stages of implementation of the survey. The principal drawbacks of this surveying technique are described as are the various factors to be considered to increase the rate of response.

Section 7.4 details the response rate obtained through the various stages of the survey. The section following this describes the principle methods which were employed to improve response rates. The final section, 7.6, comments on further research which was carried out following receipt of the questionnaires.

7.2 Sample Design

Since no one definitive listing of the names of electronics firms was available a variety or mechanisms was employed to determine the sample population. It was therefore necessary to devise an appropriate sampling frame. This is perhaps one of the most critical stages in the design of the survey. Chisnall comments that before "...a sample survey can be undertaken, it is vitally important to define closely the population that is to be sampled".[204]

The primary objective of designing a sampling frame is to avoid bias in the selection procedure. For instance bias will cause "...systematic, non-compensating errors which are not eliminated or reduced by an increase in sample size".[205] Three principle sources of bias exist, the first occurring through conscious or unconscious human choice, the second through the sampling frame not covering the population adequately, completely or accurately and finally though sections of the population being impossible to find or who refuse to co-operate.

To remove these sources of bias it is necessary to establish certain criteria that the sampling frame must satisfy. Chisnall introduces five such criteria which are useful in evaluating the suitability of sampling frames.[206]

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[204] Chisnall, 1986, p55
[205] Moser & Kalton, 1971, p79
[206] Chisnall, 1986, p55

Adequacy Sampling frames should adequately cover the sample population involved. It should also be ensured that it is adequately related to the purpose of the study.

Completeness Sampling frames that do not possess all possible population units have the inherent risk of the sample being biased. A sampling frame which is not up to date is an obvious example.

No duplication Where the possibility of duplication of an entry exists some form of weighting system should be used to avoid this bias.

Accuracy Since firms are continuously closing/opening operations it is necessary for the sampling list to be as up to date as possible.

Convenience The sampling frame must be both accessible and appropriately arranged.

The process of designing an appropriate sample list was difficult given the difference of interpretation between state and other bodies in what constitutes the electronics industry. The IDA, for example, as is the custom with most other organisations, describes the electronics industry as a combination of Electrical Engineering firms together with computer manufacturers. The former industry consists of, among others, the manufacture of electric wires, cables and so on; generally not scientific components

of the main stream electronics industry. This study, however, took a more rigorous approach to the definition of the electronics industry. Two subsectors of the Electrical Engineering industry, as indicated in Chapter five, together with the manufacturers of computer products were used to describe it. While time consuming it was therefore necessary to devise a new sampling frame. The creation of this new frame was considered justifiable for the sake of accuracy of results, since inclusion of firms, especially those such as the manufacture of wires and cables, would unnecessarily bias survey results, particularly in relation to research and development.

It should be noted that it is not unusual that such listings do not exist. Chisnall, for example comments that one "...of the most salient problems of industrial marketing research is the unavailability of suitable lists of firms on which a survey could be based".[207]

Four primary sources of information were available to develop the sample population and are outlined in figure 7.2.1 below.

[207] Chisnall, 1986, p251

Figure 7.2.1

PRINCIPAL SOURCES OF INFORMATION FOR THE DESIGN OF THE SAMPLE POPULATION	
IDA Company Listings	1992
Kompass Directories	1992
Dept. of Industry & Commerce[208]	1989
Coras Trachtala	1992

The IDA listing was the principal source of information. This listing was very useful since it not only gave the name, address and telephone number of the company but also indicated the main product line. It also gave a contact name of, for example, the general manager or managing director. This proved invaluable since having a contact name meant that the questionnaire went directly to the desired person, therefore helping to increase the response rate.

Since the principal product line of each company was available it was possible to eliminate those companies which did not satisfy one of the three criteria, i.e. be a computer, passive or active components manufacturer, for their inclusion as an electronics firm.

[208] Strategy for the Irish Owned Electronics Industry

Of the original listing of four hundred and forty firms this was reduced to one hundred and thirty eight. Using the Kompass directories it was possible to analyse industries by industrial sector. This enabled a further twelve firms to be identified. Appendix II of the Strategy for the Irish Owned Electronics Industry[209] provided a further eight firms, all indigenous, while the listing from Coras Trachtala gave one other firm. The total sample population was therefore one hundred and fifty nine.

Since the final sample size was considerably smaller than initially expected it was decided to survey all firms; effectively conducting a 'Census' of electronics establishments.

[209] Dept. of Industry & Commerce, 1989

7.3 Postal Questionnaire

Three methods may be used to survey a given population, personal contact, telephone or by postal questionnaire. Personal contact, while in some ways far superior to the other two, was eliminated given the number of firms involved and their geographical diversification. Given the nature of the survey questions, whereby answers would not have been readily available, it was decided that telephone contact would have been as inferior alternative to a postal survey. Therefore while aware of the limitations of a postal questionnaire it was decided to employ this method for sampling the population.

The design of a successful questionnaire can be a difficult and time consuming process requiring considerable preliminary investigation. Questionnaires can be described as a "...method of obtaining specific information about a defined problem so that the data, after analysis and interpretation, result in a better appreciation of the problem".[210] Figure 7.3.1 outlines the various stages involved in the implementation of the survey; these will be discussed in subsequent sections.

Since specific information is required one must be very clear in identifying the research problem. As discussed in Chapter one, Section five, the aim of the survey was to (a) gather hitherto uncollected data to examine various

[210] Chisnall, 1986, p104

Figure 7.3.1

STAGES OF IMPLEMENTATION OF POSTAL SURVEY

- Identification of Research Problem
- Strategy for Tackling Research Problem
- Preliminary Questionnaire Design
- Peer Evaluation
- Modification of Questionnaire
- Letter of Notification
- Pilot Test
- Modification of Questionnaire
- Letter of Notification
- Distribution of Survey
- Reissuing of Questionnaire to Non-Respondents
- Telephone Follow-up's

aspects of overseas investments and (b) to compare the operating characteristics of both indigenous and overseas firms. Since a mail questionnaire is an impersonal method of collecting information and does not have the flexibility of direct interviewing, whereby questions may be explained, its design is of extreme importance.

The low rates of response to mail questionnaires is perhaps one of the most significant drawbacks of this survey technique. Floyd et al, for example, comment that a mail survey of the general population, without appropriate follow up procedures, generally yields a response rate of thirty percent.[211] This response rate may of course be higher depending on external factors such as the degree of interest the respondent has in the research, his/her educational background and so on. Questionnaire design and implementation has been found to be very closely related to the response rate. Much research was conducted therefore to develop an approach which would result in a maximised response rate.

Effectively the design of a good questionnaire involves "...selecting the questions needed to meet the research objective, testing them to make sure that they can be asked and answered as planned, then putting them into a form to maximise the ease with which respondents and interviewers can do their jobs".[212] Sudman[213] and Floyd et al.[214] detail many factors which

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[211] Floyd & Fowler, 1984, p67
[212] Floyd & Fowler, 1984, p99
[213] Sudman, 1982, p262-263

act as important guiding principles for the successful design of a questionnaire. An edited version of their findings in relation to mail questionnaires is shown in figure 7.3.2 below.

Figure 7.3.2

- A self-administered questionnaire should be self-explanatory.

- Questionnaires should never use, or at least keep to a minimum, open ended questions. Open ended questions may be asked at the end of a survey.

- The questionnaire should be as short as possible with potentially redundant questions which are difficult to analyse or in anyway unnecessary left out. It must generally be short unless the topic is highly salient to the respondent.

- It should be photocopied and laid out in a way that is both clear and uncluttered. Research indicates that when as many questions as is possible are forced onto the open page it reduces the response rate relative to a survey which is suitably designed.

- Skip patterns must be kept to a minimum. If the respondent has to skip a question then this must be clearly marked with arrows or bold type print. Skip instructions must be after the question concerned.

- Early questions should not require to much detail and be non threatening.

- Questions that require multiple answers should not be split between two pages.

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[214] Floyd & Fowler, 1984, p103

Using these points as a basis the construction of the survey questions began. As previously noted the identification of the research problem enables the design of clear non-redundant questions.

Since the end quality of the research depends of the adequacy of the questions considerable emphasis was placed on their construction. Chisnall comments that questions must be "...designed to attract respondents to give valid and reliable information about the subject of the enquiry, and to do this with minimum distortion or bias".[215]

Obtaining this reliable information is subject to certain pre-conditions. The question must be as specific as possible; that is the respondent must be able to understand the question. Respondents must also be able to answer the question; which in effect means that the survey must both be addressed to the proper person and also ask questions for which answers are obtainable. Lastly, reliable survey responses will only be obtained if the respondents are willing to answer the question.

When designing the survey it was decided to use closed, rather than open ended questions. Closed questions are of the type whereby the respondent is offered a choice of alternative replies. The principal reasons for selecting this method was that;

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[215] Chisnall, 1986, p104

(a) it enabled the time to complete the questionnaire to be greatly reduced, subsequently making it more attractive to the respondent.

(b) it removed the problem of attitude statements.

(c) it enabled the respondent to answer the questions more reliably.

(d) it allowed the researcher greater reliability in interpreting the meaning of the answers.

(e) they are unlike open ended questions which have the disadvantage of allowing the respondents to give a great variety of responses that could result in problems in interpretation and analytical evaluation. On the other hand close ended questions increase the likelihood that there will be enough of respondents in a particular category, thus making the analysis statistically interesting.[216]

Closed questions also facilitate the coding of responses for computer analysis. It was decided, however, to include two open ended questions at the end of the survey to assess managers perceptions for the future of the industry. This gave additional information, qualitative in nature, which would not have been available through formal questioning and it also acted as a 'rounding off' procedure.

In total the survey consisted of twenty-three questions, some of whom consisted of several parts. Since a computer software package, SPSS-X, was to be used for the survey analysis all questions were precoded to ensure

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[216] (c), (d) & (e), Floyd & Fowler, 1984, p87

they could be used. At this point, as shown in Figure 7.3.1, peer evaluation was sought and modifications made to the original survey as a result. Before pilot testing three draughts of the survey were made. The content of the survey, however, remained the same. Following a letter of notification the survey was pilot tested on a random selection of twenty companies.

Fifteen companies responded to the survey within seven working days. Three of the remaining five firms replied within a further three days following telephone reminders. No problems were indicated with any of the questions and it was decided that no further modifications were necessary. A preliminary letter of notification was posted directly by name to the managing director of each company seven days prior to the postage of the survey. The reason for preliminary notification was to help increase the response rate to the survey and is discussed in the following section. The letter used is shown in Appendix 'B'.

7.4 Response Rate

In total the sample population consisted of one hundred and fifty nine firms. This represented every firm in Ireland which fit one of the three criteria, as discussed in section 7.2, so as to be termed an electronics operation. It included both foreign owned and indigenous firms.

It was initially expected that a maximum response rate of circa forty percent would be achieved if preliminary and follow up techniques were used. A response rate of this order of magnitude would have been highly acceptable for a mail questionnaire. In postal surveys the term 'response rate' may be defined as the percentage of total firms who return a usable questionnaire. Firms who return the questionnaire incomplete are not included.

Following the postage of the survey it was found that nineteen firms had either ceased operations or gone into liquidation. The total sample size could therefore be reduced to one hundred and forty. After follow up techniques were used the response rate achieved was a highly acceptable seventy percent. Further research indicated that while thirty per cent of firms did not respond to the survey they accounted for less than ten per cent of the total number employed in the industry. In effect the survey results accounted for firms which provided over ninety per cent of total employment in the electronics industry. Table 7.4.1 below provides an indication of how this response rate was achieved.

Table 7.4.1

SURVEY RESPONSE RATES FOR INDIVIDUAL STAGES OF THE POSTAL QUESTIONNAIRE		
Stages	*Number of Replies*	*Response Rate*
Initial Mailing	64	45.7%
Follow up (Mail Reminder)	28	20.0%
Follow up (Telephone)	6	4.3%
Total	98	70.0%

Following the initial mailing sixty four firms, or 46%, responded to the survey. This was substantially increased, by twenty four percent, after reminders were posted and telephone follow-ups used. Other questionnaires were also returned but eight of them were unusable. Two others were received several months after the data had been tabulated and analysed and were not included. By mail questionnaire standards the response rate of seventy per cent was significantly higher than expected. Several reasons, related directly to the survey planning, may explain this and are discussed in the following section.

It should be noted that other external factors, beyond the researchers control, could have been responsible for the high response rate. Two in particular must be mentioned. The first is the fact that the object of the survey may have been salient to the managing directors of each company, thus increasing the propensity of their completing the questionnaire. Indeed

the large number of respondents who indicated that the would like a copy of the research findings would seem to confirm this.

The educational qualifications of the respondent may have also had some effect on the response rate. Moser & Kalton comment that "...the less educated, i.e those in the lower occupational categories...have a higher than average rate of non-response".[217] Alternatively one could expect that the higher the educational qualification of the sample population the higher the response rate. Since the survey was posted to managing directors, who by nature would generally have higher qualifications or a better than average educational background, it appears to have had a positive affect on the response rate.

[217] Moser & Kalton, 1971, p263

7.5 Methods of Improving Response Rates

Since non response is a major disadvantage of mail questionnaires much research has been conducted to determine both its causes and the identification of the subsequent steps which may be taken to reduce it. Some of the factors may be outside the control of the surveyor but most likely there are steps which may be taken to increase the survey response rates. One step, as identified by Floyd, is that "...almost anything that makes a mail questionnaire look more professional, more personalised, or more attractive will have some positive effects on response rates".[218]

In general the response rate to a survey can be described as being influenced at three different stages; before postage through preliminary notification, at postage via concurrent techniques and after a period of time through telephone and/or postage follow-up techniques.

7.5.1 Preliminary Notification

Chisnall comments that it is the lack of identification with the purpose of a study which is one of the most important reasons in explaining the non-response of a mail survey.[219] To remove this problem a letter of preliminary notification of the arrival of the survey was sent to the managing director of each firm. To make the letter more official it was printed on Dublin Business School letter headed paper. Since contact names were

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[218] Floyd & Fowler, 1984, p54
[219] Chisnall, 1986, p257

available this method was chosen in preference to telephoning each individual company which is both exceptionally time consuming and costly. A copy of the letter is available in Appendix 'B'.

There were several objectives in sending this letter. It (a) explained the purpose of the research, (b) identified the researcher, (c) detailed when the survey would be sent out, (d) gave the firm the opportunity to voice concern or express an opinion of the survey and (e) removed any fears of completing the survey by stressing the confidentiality of the response.

Before the survey was posted three firms responded to the preliminary notification and indicated that as a matter of company policy they did not wish to participate in the survey

7.5.2 Concurrent Techniques

Concurrent techniques may be described as those mechanisms used to increase the survey response rate which are employed by the researcher at the time of postage of the questionnaire. Much debate surrounds the advantages of using these techniques by surveyors. Concurrent techniques include the usage of coloured paper, using pre-postage paid or business reply envelopes, sponsorship, gifts and so on.

While debate may surround many of these issues it was felt that three important factors existed and would have to be addressed to obtain a

successful response rate; a covering letter must be provided, the survey must be as professionally presented and printed as possible and finally confidentiality must be stressed. Kalton et al. comment that a good covering letter should "...explain in simple terms why the survey is being undertaken, and why and by whom it is considered important".[220]

The reasons for the inclusion of a covering letter may be summarised as follows:

(a) To explain to the prospective respondent who the surveyor is and the objectives of the research.
(b) To remind the respondent of his/her prenotification.
(c) Stressing the importance of the contribution that the respondent will provide to understanding the trends of manufacturing firms.
(d) Assuring the respondent of the confidentiality of the survey and notifying him/her that survey findings will be available upon request.
(e) The encouragement of objective comments and queries.

Like the preliminary letter of notification the covering letter was printed on Dublin Business School letter headed paper and is shown in Appendix 'C'. The survey questionnaire was laser printed and reproduced on high quality paper for the purposes of clarity and professionalism. A covering page was designed which included the name of the researcher, the title of the research

[220] Moser & Kalton, 1971, p265

and the date. It also emphasised the confidentiality of the research. As in all previous cases this title page was reproduced on Dublin Business School letter headed paper and is shown with the survey in Appendix 'D'. As is customary a stamped addressed envelope (SAE) was included for the return of the completed questionnaire. The complete package, i.e. the questionnaire, covering letter and SAE was posted directly to the managing directors of each company.

7.5.3 Follow Up Efforts

A total of sixty four valid responses were received from the first mailing. Since there was a strong likelihood that questionnaires may have been mislaid or simply put aside it was decided to follow up the initial mailing by sending out another questionnaire to non-respondents. Empirical work by Scott indicates that follow up reminders increase the response rate by an average of twenty percent.[221]

Another covering letter, indicated in Appendix 'E', was draughted and posted along with a questionnaire and SAE to non-respondents. The covering letter again introduced the nature of the research and reminded firms that a survey which had been sent to their firm had not yet been received.

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[221] Moser & Kalton, 1971, p266

The importance of confidentiality was again stressed as was the right of the respondent to ignore any questions that were perceived to be too sensitive. Respondents were also asked to return the questionnaire even incomplete so that they could be removed from the mailing list. Following this reminder a further twenty eight responses was obtained. This increased the response rate to just below sixty six percent. Follow up telephone enquiries increased the response rate by just over four percent, giving the total response rate of seventy per cent.

7.6 Further Research

The survey results indicated that eleven of the indigenous firms were formed through spin-off's from overseas firms. A surprising feature of this figure was that a considerable proportion of these firms employed more than one hundred persons. It was decided to investigate how these firms were formed; in other words to determine how many were formed through entrepreneurial start-up's, management buy-outs and so on.

Following discussions with the IDA access to confidential files on all of the firms involved was obtained. From their database it was possible to identify how these firms were formed and where their current markets lie. Since some of the firms were in the Limerick/Clare region SFADCO was contacted and similar information was sought.

For completeness it was decided to examine how those indigenous firms which did not respond to the survey were formed. In this way it was hoped to obtain information on all indigenous firms which were formed through spin-off's from overseas firms. Again access to IDA and SFADCO files was obtained.

A discussion of these research finding, and implications, is discussed in Chapter eight, question fifteen part (b).

CHAPTER EIGHT

SURVEY RESEARCH FINDINGS

Discussion and Analysis

8.1 Introduction

This chapter presents an overview of the research findings obtained from the 'Census' of Irish electronics firms. Questions are analysed and compared with the expected responses from the perspective of both the theory of foreign investment and the behaviour patterns of indigenous electronics firms.

The total number of respondents was ninety eight. This was equivalent to an effective response rate of seventy per cent, representing over ninety per cent of the total numbers employed in the industry in Ireland. The results consisted of respondents from forty three indigenous owned firms, thirty US owned, one UK, eight German and sixteen other firms. Appendix 'D' details the survey questionnaire.

Where useful the results are discussed with respect to the trends of firm ownership.

8.2 Survey Results

Question one *What is the principal activity of your firm*

Information was not available, or was unclear, with respect to some of the firms to determine their principal activities. This question was used to 'screen' the respondents to indicate if they were involved in the manufacturing or services sector. It was principally used to determine those firms which operated in the software industry since they are not, by the survey definition, regarded as electronics establishments. All firms who replied to the survey indicated that they were involved in the manufacturing sector. Therefore none of the survey responses had to be ommitted.

Question two *In what year was your firm established in Ireland*

This question enables a comparison to be made of the operating characteristics of those firms which are more mature to determine if, for example, they are more closely integrated with the local economy to the newer investments. Table 8.2.1 below presents a summary of the findings.

Table 8.2.1

NATIONALITY OF FIRM OWNERSHIP BY YEAR ESTABLISHED IN IRELAND		
Nationality	*Pre 1973*	*Post 1973*
Irish	4	37
US	3	25
UK	0	1
German	2	5
Other	2	14

An interesting feature of the data is that 11 firms were established both prior to Ireland's entry to the EEC and the development of the modern electronics industry. Four of these firms were indigenous owned, three US owned, two German and two 'Others'. These firms could be regarded as being of the previous generation of successful firms as they have had the capacity to readjust their production facilities and switch away from more traditional to modern industries.

In total eighty two firms were formed between 1973 and 1992 while five gave no response to the question. The majority of the firms were formed over the period 1979 to 1986, the figure being fifty. Seven indigenous firms were formed between 1973 and 1978, twenty five over the former period and five since then. All but three US firms were established in Ireland after 1973, four between 1976 and 1978, fifteen between 1979 and 1986 while the remaining six were established since, with one as recent as 1992.

The only British firm was established in 1988. Of the remaining two categories one German firm was formed in 1973, two prior to this, and finally four since 1981. In the 'Other' category, two were formed before EEC entry, four before 1980 and the remaining ten since then.

Question three *Which, if any, of the following factors influenced the investment decision in Ireland*

This question sought to establish why firms have invested in Ireland. It is expected that indigenous firms would indicate that they were established in Ireland primarily because their owners are Irish. The response is expected to be considerably different for overseas firms. Chapter four suggested that the primary attraction of Ireland as a location of for foreign investment industry is as a result of a combination of factors, most notably tariff free access to the European Community and the various grant concessions on offer.

The survey results indicated that no firm set up in Ireland for either 'Fixed Asset Incentives Packages', 'The Supply of Skilled Labour' or 'Research and Development Grants' alone. Three firms indicated that they set up for no other reason than to avail of 'Tax Concessions', one firm each for the 'Supply of Manual Labour' and 'Proximity to the European Market'. The majority, sixty seven per cent of the respondents, indicated that they have established for a combination of factors, generally depending on the

nationality of ownership of the firm. Twenty two of the respondents indicated an 'Other' reason for establishing in Ireland. Four firms did not provide any response.

Table 8.2.2 below analysis the survey results by nationality of ownership.

Table 8.2.2

NATIONALITY OF OWNERSHIP BY MOTIVATION FOR INVESTMENT DECISION IN IRELAND					
Nationality	*Tax*	*Manual Labour*	*European Market*	*Combina -tion*	*Other*
Irish	2	1	-	17	20
US	-	-	-	29	-
UK	-	-	-	1	-
German	1	-	-	6	1
Other	-	-	1	14	1

The survey results correspond to what the theory would suggest. Of the forty indigenous firms which responded to this question two indicated that their firm was set up to avail of tax incentives while one respondent indicated that it was the supply of manual labour alone which prompted the investment decision. The majority of the respondents indicated that they established their firm for an 'Other' reason, the primary and most obvious, being that firm founders are Irish. The remainder of the indigenous respondents indicated that their firms were formed either through management buy-outs, purchases from a receiver or because of their identification of market niches not yet occupied.

The twenty nine respondents from US owned firms all indicated that they invested in Ireland for a combination of factors. None ranked any one incentive above the others. Tax concessions, the proximity to the EC and the availability of skilled labour were, as expected, the most favoured incentives. Nine firms, just under a third of the respondents, did not include 'Fixed Asset Incentives' as being important. This is surprising considering the number, and value, of the grants available. This may lend credence to the argument, and as commented by Telesis (see Chapter four), that the numbers and levels of grants available is too high.

All but seven of the US respondents indicated that tax concessions was one of the factors influencing the investment decision. These firms generally regarded the supply of skilled labour and the proximity to the EC market as being more important. Four respondents indicated that proximity to the European market was not important.

Only three respondents did not include the supply of skilled labour in any combination, reflecting why perhaps much of IDA literature is keen to advertise the ready supply of skilled labour in Ireland. A considerable proportion, eighteen respondents, did not rank the supply of manual labour as in any way influencing the investment decision. This is surprising given that, as Chapter four notes, the majority of the operations carried out by US affiliates in Ireland are relatively low skilled assembly operations.

This discrepancy may perhaps be explained by the respondents perception of the difference of 'skilled' and 'manual' workers. Employees of the firms in question may be regarded by the respondent as being 'skilled', because they generally carry out the assembly of high-tech products, even though the operation can generally be regarded a technologically simple. It is this difference in the perception between 'skilled' and 'manual' labour that could account for the results.

Surprisingly several of the respondents indicated that research & development grants influenced the investment decision. As later questions show and as suggested by the theory of multinational behaviour, multinationals particularly from the US, for a variety of reasons do not locate their research facilities abroad. Therefore one would not expect the respondents from US firms to have indicated R & D grants as of importance.

It is interesting to note, however, that three of the firms which indicated that R & D grants are important do not have any research facilities themselves, although it is unclear if they are engaged in any other form of extramural research activities. The levels and type of R & D carried out by US multinationals will be discussed in question sixteen.

The one UK respondent indicated that its firm was influenced to invest by all factors, excepting R & D grants and the availability of manual labour. The motivation of the eight respondents from German affiliates was

generally similar to those of US affiliates. However one firm indicated that it invested purely for tax reasons while another invested because of proximity to the Shannon region. The remaining six respondents all indicated motivating factors similar to the US with tax concessions, proximity to the European market and the supply of skilled labour being the most important.

In the 'Other' grouping of countries, primarily from Japan and Netherlands, one indicated that proximity to the European market alone influenced the investment decision while another invested for contractual reasons with Telecom Eireann. Once again no readily discernible differences were obvious for the motivation of these firms to invest in Ireland than in each of the other overseas groupings.

The survey results would seem to indicate that, as expected, the primary motivation for investment by overseas and indigenous firms is quite different. The former invest for a combination of reasons, most notably tax incentives, proximity to the European Market and finally the supply of labour. Indigenous firms, as expected, were predominantly formed because their owners are Irish, the remainder being formed through MBO's or purchases from the liquidators of overseas or indigenous firms.

Question four *Were you involved in the investment decision*

The primary reason for this question was to evaluate the response to the previous question. If, for example, the response to question three indicated motivations for investment considerably different to the theoretical expectations then this question could be used to determine the accuracy of responses given that it would be known if the respondent was involved in the investment decision. This question also gives an indication if, in the case of overseas firms, any managing director was involved in the initial phases of the decision making process.

Given the recency of entry to the market of indigenous firms combined with the fact that they are generally small, effectively meaning that the survey respondent is the manager, it may give an insight into if the initial founder has subsequently conceded control. Overall thirty seven of the respondents indicated that they were involved in the investment decision, the majority, fifty nine indicating that they were not. There was two non-replies to the question.

Table 8.2.3 below summarises the results again by nationality of ownership.

Table 8.2.3

NATIONALITY OF OWNERSHIP BY RESPONDENTS INVOLVEMENT IN THE INVESTMENT DECISION		
Nationality	*Yes*	*No*
Irish	31	10
US	4	26
UK	-	1
Germany	-	8
Other	2	14

Thirty one of the respondents working in indigenous firms indicated that they were involved in the decision process, while ten indicated that they were not. This is as expected since indigenous firms which have been established, especially over the recent past, are small and remain in the control of the founder. The ten respondents who indicated that they were not involved in the decision process generally worked for the larger, longer established firm.

The findings were very different for overseas firms. Just four of the respondants working for US firms were involved in the decision process while twenty six were not. In total twenty three of the respondents in the UK, Germany and 'Other' categories combined were not involved in the decision process, while only two were. The respondents, while not directly involved in the decision making process do seem to be aware of the motivation for the initial investment as the results of question three are generally as expected.

Question five *How many persons are employed by your firm*

Data from chapter five indicated that overseas firms are considerably larger than their indigenous counterparts. The average number employed in overseas firms is 150 compared to an indigenous average of 20. This small size of indigenous firms has been highlighted as a major weakness of the Irish electronics industry. It has had the effect of reducing their capacity to engage in R & D and also severely limits their available financial resources for, for example marketing, thereby inhibiting their growth potential.

Table 8.2.4 below summarises the research findings.

Table 8.2.4

NATIONALITY OF FIRM OWNERSHIP BY NUMBER OF PERSONS EMPLOYED				
Nationality	*Under 50*	*50-99*	*100-149*	*150 & Over*
Irish	30	7	2	4
US	7	4	4	15
UK	-	1	-	-
German	3	2	1	2
Other	4	2	3	7

The survey results indicate that forty four of the firms employ less than 50 people, while sixteen firms employ 50-99, ten with 100-149 and finally twenty eight firms employing 150 persons or over. Indigenous firms

account for the majority of the 'under 50' category. Out of a total of forty four, thirty indigenous firms are in this category, the remainder working for overseas firms. The majority of the smaller indigenous firms operate in the data processing industry, with the larger ones generally corresponding to the manufacturers of active and especially passive components, that is the R & T and ET sectors.

Overseas firms account for a substantial share of the larger firms. Seven indigenous, and nine overseas, firms employ 50-99 persons. Just two of the former employ 100-149 persons, the latter accounting for the remaining eight. In the 150 & over category, indigenous firms account for just four out of a total of 28 firms.

US firms account for a considerable proportion of the total numbers employed. This data is consistent with the findings in Chapter five when it was indicated that overseas firms, particularly those which are of US origin, account for a substantial share of total employment. Approximately two-thirds, nineteen firms, employ 100 persons or over, with a significant proportion (15 out of the 19) employing more than 150 persons. Four firms employ 50-99 while the remaining seven firms employ less than 50.

Unlike the indigenous sector the larger US electronics firms are predominantly concentrated in the data processing industry. These trends are consistent with those indicated in Chapter five, whereby US firms were

attributed to accounting for a substantial share of the total employment in this sector. In the remaining three overseas subdivisions seven firms employed less than 50 persons, four each 50-99 and 100-149 while nine firms employed 150 & over.

Question six *Does your firm export*

Chapter four indicated that one of the primary motives for investment in Ireland by overseas firms was for tariff free access to the European Community. Given also that very few overseas firms have invested to supply local markets the expectation is these firms will indicate a very high export propensity. The expectation is that indigenous firms, being small, and the capacity in which they operate will have lower export ratios.

Of the ninety eight respondents all, except three indigenous firms, indicated that they exported some proportion of their sales. Each of these three indigenous firms employed considerably less than 50 persons indicating, for a variety of reasons, that they probably have not the capacity to export even if it were advantageous to the firm.

Question seven (a) *What percentage of sales is exported*

It is expected that overseas firms will exhibit a high export propensity primarily because of their motivation for investment in Ireland. It could also

be hypothesised, given the relatively small size of the Irish market that indigenous firms will export some of their sales, providing they do not act exclusively as subsuppliers to multinationals or are very small operations operating in limited market niches.

The majority of firms, sixty one out of an exporting total of ninety five, indicated that over 70% of their sales was exported. This is not surprising given, as noted, the trends of overseas investment in the industry and the limited size of the Irish market. Eight firms export under 10%, 10-29% and 30-49% while ten export between 50 and 69% of their sales.

Table 8.2.5 provides an analysis of these results by nationality of ownership.

Table 8.2.5

PERCENTAGE OF SALES EXPORTED BY NATIONALITY OF OWNERSHIP					
Nationality	*Under 10%*	*10-29%*	*30-49%*	*50-69%*	*70% & Over*
Irish	7	6	4	8	15
US	-	1	1	-	28
UK	-	-	-	-	1
German	-	1	-	-	7
Other	1	-	3	2	10

Size was an important factor affecting the proportion of sales exported. Seven indigenous firms exported less than 10% of their sales. These were generally characterised as being of the smaller type of firm, with six of them employing less than 50 persons. One firm, in the 'Other' category also exported less than 10% of its sales, less than 50 persons employed here as well. The remaining indigenous exporting firm was, however, considerably larger, employing over 150 persons, indicating for whatever internal reasons that it perceived the Irish market as more important than any overseas.

Of the eight firms exporting 10-29% of their sales six were indigenous owned, one US and one German. Four of the indigenous firms employed less than 50 persons, two 50-99 while both the overseas firms employed more than 150. The relatively low proportion of sales exported by the overseas firms is unexpected. A characteristic of each of these firms is that they have invested mainly to supply the Irish market but do not act as subsuppliers to other firms.

Four indigenous and overseas, one US and three 'Other', firms export 30-49% of their sales. Three of the former employ less than 50 persons with one employing 150 & over. The one US firm is small employing less than 50 while one each of the remaining 'Other' firms employs 50-99, 100-149 and 150 & over.

Indigenous firms account for eight of the ten firms exporting between half and 69% of their sales. Again the numbers employed vary considerably, with three employing over 100, one 50-99 and the remainder employing 50 or less. The two remaining firms are in the 'Other' category with one each employing 50-99 or 50 and less.

Overseas firms are responsible for exporting the most considerable proportion of their sales. US firms account for the majority of these with many exporting practically all of their sales. Twenty eight out of the total of thirty US respondents are represented in this category. A characteristic of these firms is that, in the context of Irish industry, they are quite large, with 14 employing 150 & over, four each employing 100-149 and 50-99 and six employing 50 or less.

Similarly in the German and 'Other' categories firms show very high export propensities, with six out of the seven former respondents exporting over 70% of sales, the figure being 10 out of sixteen for the latter. The one UK firm is also represented in this category.

Indigenous firms have a much lower export propensity than overseas firms. Their small size in general together with their relative lack of marketing experience may inhibit their attempts to obtain a foothold in export markets.

Question seven (b) *What percentage of sales is exported to the EC*

The expectation is that a considerable proportion of sales by overseas firms will be sold in the European Community. Indigenous firms who export are also expected to sell a significant proportion of their sales in the EC market since it is unlikely that they would have had the capacity to expand considerably beyond it.

All of the firms which indicated that they sold goods abroad exported some proportion of their output to the EC. Eleven indicated that they sold under 10%, fourteen between 10-29%, ten between 30-49%, twenty four between 50-69% and finally thirty six sold 70% or higher in the EC market. Comparing the levels exported with the previous question one can immediately see that for both overseas and indigenous firms the Community, while constituting the most significant market, is by no means the exclusive destination.

The following table provides a classification of results by nationality of ownership.

Table 8.2.6

PERCENTAGE OF SALES EXPORTED TO THE EC BY NATIONALITY OF OWNERSHIP					
Nationality	*Under 10%*	*10-29%*	*30-49%*	*50-69%*	*70% & Over*
Irish	8	7	3	11	11
US	2	6	4	6	12
UK	-	-	-	-	1
German	-	1	-	2	5
Other	1	-	3	5	7

Twenty two indigenous firms export 50% or over of their sales to the EC. This is similar to the previous question whereby twenty three firms indicated that they exported in this range abroad. The proportion exporting a considerable amount of sales is less, however, with eleven firms (the previous being fifteen) exporting 70% or over.

The number of indigenous firms exporting in the range 50-69% increased by three firms to eleven, each of these originating from the number exporting 70% and over. The proportion of firms in each category exporting less than 50% of sales to the EC remained much the same. It would appear that some indigenous firms have expanded their markets beyond the European Community. Interestingly they are all, in general, of relatively small size.

Overseas firms indicate that a considerable amount of their sales do not

occur within the EC. Twenty eight US firms indicated that they exported 70% or more of their sales, yet only twelve of these exported this proportion to the EC. The majority of these firms were of the larger type employing 100 persons or more. The number of US firms exporting 50-69%, 30-49%, 10-29%, and under 10% of their sales to the EC all increased by six, three, five and two respectively, each increase being attributable to the decline in the numbers exporting over 70% to this market.

These trends are in some respects unexpected, for as previous discussions note, the primary motivation for US investment in Ireland is to supply the European electronics market. Short term analysis in Chapter five, however, indicated that US computer firms did appear to be switching away from the EC market. The EC market may therefore be regarded as the primary but not exclusive end market. Since firms have established manufacturing satellites they must perceive Ireland to have other location specific advantages, be it the low rates of corporation tax, other state incentives or the supply of relatively cheap skilled labour.

The one UK subsidiary relies exclusively on the EC market. Both German and firms in the 'Other' category exhibit similar characteristics, though not to the same degree as their US counterparts, whereby the EC is not the exclusive end market. Seven German firms indicated that they exported over 70% of sales, five of whom exporting this amount to the EC, the remaining

two exporting 50-69%. One firm exports 10-29% of its sales to the community, the remainder being sold on the Irish market.

In the 'Other' category three firms which indicated that they export in total over 70% of sales export 50-69% to the EC. Seven firms in all export over 70% to the EC with five exporting 50-69%. No change in the percentage of sales exported to the EC occurred for the four remaining firms. Three of these export 30-49% of sales and one under 10% to this market.

The EC, as the theory suggests, is generally the primary location for sales which are exported. The survey did, however, reveal some unexpected results, especially in relation to US multinationals, which indicated that not all sales exports occur within the EC.

Question seven (c) *Do you export to an affiliated company*

Multinationals which have invested in Ireland, as is the case with electronics multinationals in general, can be regarded as being vertically integrated. This means that a considerable proportion of their sales is exported to affiliated companies. Indigenous firms may also use affiliated companies to sell their products abroad although it is expected, because of their small size, that they will use affiliated companies to a much lesser degree. The survey results indicated that fifty two firms exported to affiliated companies, while forty three did not. Three firms were not applicable. By nationality

of ownership the results were as follows.

Table 8.2.7

DOES FIRM EXPORT TO AN AFFILIATED COMPANY BY NATIONALITY OF OWNERSHIP			
Nationality	*Yes*	*No*	*NA*
Irish	9	31	3
US	22	8	-
UK	-	1	-
German	8	-	-
Other	13	3	-

As expected overseas firms indicate that they have a much greater propensity to export to affiliated companies than indigenous firms. An unexpectedly high number of indigenous firms have, however, indicated that they too export to affiliated companies. Nine indigenous exporting firms, just under 25% of the total, export to affiliated companies while thirty one do not. The number exporting to affiliated companies is further unexpected since six of these firms are quite small, employing less than 50 people. Of the three others two employ 50-99 and one employs 100-149. Three firms are 'not applicable' since they have previously indicated that they do not export.

Overseas firms exhibited a much greater likelihood of exporting to affiliated companies. Twenty two US affiliates, including twelve out of fifteen of the largest (employing 150 & over), out of a total of thirty export to affiliated

companies. The UK firm sells its products directly abroad, while all the German firms export some percentage of the output to affiliated companies. Thirteen of the sixteen, 'Other' firms export to affiliated companies.

The survey indicates that in general overseas firms which have invested in Ireland may be regarded as vertically integrated, that is they act in the capacity of being just one stage in the production process. The following question examines the proportion exported to affiliated companies.

Question seven (d) *What percentage of total exports is exported to affiliated companies*

The majority of the respondents, who indicated that they export to affiliated companies, export more than 50% of their sales to them. Thirty one export more than half to affiliated companies while twenty export less than 50% to them. One German firm did not respond to the question.

Table 8.2.8 indicates the proportion of sales exported to affiliated companies by nationality of ownership.

Table 8.2.8

PERCENTAGE OF SALES EXPORTED TO AFFILIATED COMPANIES BY NATIONALITY OF OWNERSHIP						
Nation-ality	*Under 10%*	*10-29%*	*30-49%*	*50-69%*	*70% & Over*	*NA*
Irish	4	3	-	1	1	34
US	3	4	3	6	6	8
UK	-	-	-	-	-	1
German	-	1	-	3	3	-
Other	1	1	-	3	8	3

Two indigenous firms sold over 50% to affiliated companies, the remaining seven firms exporting under 29%. Of the forty two overseas firms twenty nine exported more than 50% to affiliated companies. US firms account for the most substantial proportion exported to affiliates with twelve exporting over 50%, the remaining ten exporting less than 50%. Those firms exporting over 50% to affiliated companies tend to be among the largest of the firms that have invested. Of the twelve nine employ 100 or more, two 50-99 and one less than 50.

This data confirms the hypothesis that US firms which have invested in Ireland are vertically integrated. Such high proportions of sales exported by the larger firms would at first indication give the impression of considerable export earnings by US subsidiaries for the economy; though as previous discussions have shown such firms generally import a consider-able proportion of their inputs, thereby reducing 'real' earnings.

Both German and 'Other' firms also show a very high export propensity to affiliated companies. Six of the seven German firms export 50% or more while eleven of the thirteen 'Other' firms export the same proportion. Firms in the 'Other' category display very similar trends to the US with the largest firms exporting the highest percentage to affiliated companies. Nine of the eleven firms employ more than 100, the remaining two employing less than 50. Unlike either US or 'Other' firms German firms exporting over 50% are proportionately smaller. Only two of the firms employ 100 or more while one employs 50-99 and two 50 or less.

The data verifies the expectation that overseas firms which have invested in Ireland act only as one stage in the production process. Both US and 'Other' firms in particular exhibit these characteristics. High levels of intra-firm trade, particularly by US firms, also give multinationals the capacity to engage in profit switching transfer pricing, as outlined in Chapter six.

Question eight *Of existing supplies of inputs what percentage are from indigenous sources*

A common criticism of overseas industry, (see Chapter three), and as commented in Chapter six, is that they are not closely integrated enough with the economy and do not source locally to any significant degree, thus removing considerable economic gain from their investments.

It may, however, be noted that the even if overseas firms were willing to source locally indigenous suppliers may not have the capacity to supply the required products at suitable costs and quality. The unavailability of local supplies may partly be shown if the data indicates that indigenous firms do not show any greater likelihood of sourcing their supplies locally.

The survey results indicate that in general firms do not source any substantial proportion of their inputs locally. Potential reasons may be because of unavailability, high costs or low local supply quality. Over sixty per cent of the respondents sourced less than 29% locally, twenty five between 29-69% while only eight per cent sourced more than 70% locally. Six firms did not respond to this question. Table 8.2.10 presents a summary of the results.

Table 8.2.9

NATIONALITY OF OWNERSHIP BY PERCENTAGE OF SUPPLIES FROM INDIGENOUS SOURCES					
Nationality	*Under 10%*	*10-29%*	*30-49%*	*50-69%*	*70% & Over*
Irish	11	14	5	7	5
US	8	11	6	2	1
UK	-	-	-	1	-
Germany	5	1	-	1	1
Other	6	3	1	2	1

As expected overseas firms do not source a very high proportion of their inputs locally. Just three of these respondents, out of a total of fifty,

indicated that they sourced more than 70% of their inputs locally.

The majority of the overseas respondents sourced less than 30% in Ireland. The corresponding figures were nineteen (out of twenty eight), six (out of eight) and nine (out of thirteen) firms for the US, Germany and 'Other' countries respectively. Six US firms and one 'Other' sourced 30-49% locally. In the remaining two categories two US firms sourced 50-69%, one UK & German and two 'Others' the same proportion. The final 70% & over category was comprised of one firm each from the US, Germany and 'Other' countries.

It would therefore appear that there is considerable loss to the economy by overseas firms not sourcing locally. However where multinationals have sourced to a high degree (i.e 50% & over) it has tended to be from the larger firms employing over 100 persons. For example the three US firms which source over 50% locally all employ over 100 persons, a similar case arising in the German and 'Other' firm category which source over 70% locally. These firms by virtue of their large size, while by far the minority, may provide considerable returns to local indigenous suppliers, though it remains uncertain if the supplying firms are themselves subsidiaries of other multinationals.

A surprising feature of the data is that indigenous firms, while sourcing to a higher degree than overseas firms, do not purchase any considerably

greater proportion locally. In fact twenty five firms, out of a total of 42 respondents sourced less than 29% in Ireland. Five firms each sourced 30-49% and seven 50-69%. Only five firms purchased over 70% locally.

Indigenous firms which sourced, as a percentage of total, a higher amount locally were generally small, the larger ones generally purchasing much lower amounts locally. Four indigenous firms employing over 150 persons sourced less than 10%, one 10-29% and one 29-49% locally. Of the twelve purchasing more than 50% locally 10 employed less, considerably in most cases, than 50 persons while the remaining two were larger one each employing 50-99 and 100-149.

A possible reason for the different trends may be that smaller firms may not have the capabilities or resources available to source abroad to any significant degree. Question ten (c) provides further details on the reasons for the predominant sourcing abroad.

While indigenous firms appear to source a greater percentage locally, it may well be that, in value terms, the amount sourced by multinationals may be substantially higher. The relatively low degree of local purchases by indigenous firms, particularly by those which are larger, is not without significance. It may mean that there are no indigenous firms supplying these inputs at all, or those that are, do not produce in sufficient quantities, quality or at a competitive costs.

Question nine (a) *Do indigenous suppliers provide inputs, or services, of sufficiently high quality*

The previous question indicated that both overseas and indigenous firms do not source any substantial proportion of their inputs locally. This question seeks to determine the general opinions of manufacturers to the quality of supplies provided by indigenous firms.

The results indicate quite contrasting differences of opinion with respect to the quality of inputs or services provided by indigenous firms. In total 78 firms indicated that they were satisfied with the levels of service while 17 indicated that they were not. Three firms did not respond to the question.

Table 8.2.10

SATISFACTION WITH QUALITY OF SUPPLIES FROM INDIGENOUS SOURCES BY NATIONALITY OF OWNERSHIP		
Nationality	*Yes*	*No*
Irish	33	9
US	28	1
UK	1	-
German	5	3
Other	12	3

Nine indigenous firms indicated that they were not satisfied with the quality of goods and services provided by indigenous suppliers. Seven overseas firms, out of a possible total of fifty three, were not satisfied. Dissatisfaction was most common in firms employing 50 persons or less.

US firms were generally content with the levels of service, with only one indicating dissatisfaction. Alternatively a significant proportion of German firms, three out of eight, were not satisfied. In the 'Other' category three firms indicated dissatisfaction.

For a variety of reasons, discussed in question ten, firms indicating dissatisfaction have generally indicated that in the future they will not be increasing their levels of local sourcing. Firms which have indicated dissatisfaction with local supplies have tended to be those which purchase only a small proportion of their inputs locally. For all nationalities these producers tend to source on average less than 29% of their inputs locally.

Certain aspects of multinational behaviour, as discussed in Chapters two & three, lead to the expectation that even if indigenous suppliers can provide goods or services of sufficiently high standards it may not cause any greater degree of purchases by the subsidiary. Therefore while the data may suggest that multinationals are happy with local supplies it does not lay any great foundations for optimism for the future development of an indigenous sub-supply sector.

Question nine (b) *What are the primary causes of dissatisfaction*

Causes of dissatisfaction with indigenous suppliers may originate from several different sources. Sources of dissatisfaction may occur due to, among others, poor quality, high costs or indigenous firms failing to maintain delivery supplies. The respondents were asked, where applicable, to indicate if any of these were the primary cause of dissatisfaction.

The most common cause of complaint, indicated by seven of the sixteen respondents, was the cost of indigenous supplies. Three firms indicated problems with maintaining delivery supplies, two mention an 'Other' reason while the remaining four firms mentioned problems maintaining delivery supplies with at least one other factor. No firm indicated poor quality alone as a cause of dissatisfaction. Three firms did not respond to the question. Table 8.2.11 below provides a more complete analysis of the results.

Table 8.2.11

CAUSE OF DISSATISFACTION WITH INDIGENOUS SUPPLIERS BY NATIONALITY OF OWNERSHIP								
Nation.	*Poor Quality*	*High Cost*	*Maintaining Delivery Supplies*	*High Cost & Main. Delivery Supplies*	*Poor Quality & Main. Del Supplies*	*Poor Qual, Cost & Main. Del*	*Other*	*N.A*
Irish	-	3	2	-	1	1	2	33
US	-	-	-	1	-	-	-	28
UK	-	-	-	-	-	-	-	1
German	-	2	-	-	-	1	-	5
Other	-	2	1	-	-	-	-	12

A feature of the data is that approximately 20% of the respondents indicated some form of dissatisfaction with the quality of service from indigenous suppliers. This proportion could possibly be increased substantially if one is to consider that a large proportion of firms, who indicated satisfaction with indigenous supplies, have probably in fact not tried to source locally to any significant degree.

Three indigenous firms indicated that the high costs of local supplies caused dissatisfaction. This was also mentioned by both two of the German and 'Other' firms. Two indigenous firms and one 'Other' firm indicated maintaining delivery supplies as a problem.

Two indigenous firms also mentioned an 'Other' reason for dissatisfaction. In both cases this was because of a lack of variety of products. Only one US firm was dissatisfied and this was because of a combination of high costs and problems maintaining delivery supplies. One indigenous firm indicated both poor quality and problems maintaining delivery supplies while both a German and an Irish firm indicated a combination of poor quality, cost and maintaining delivery supplies.

Studies carried out by among others the Telesis consultancy group, as far back as 1982, highlighted all of the above as major constraints in the development of an indigenous sub-supply sector.[223] It does appear that the

[223] Telesis, 1982, p128-132

same problems persist with even indigenous firms not sourcing to any significant degree. It is perhaps the small size of indigenous supply firms together with their lack of experience which limits their capacity to act in a sub-supply function.

Question ten (a) *Does your firm intend to source a greater proportion of its inputs locally*

This question seeks to establish whether or not firms intend to source a greater proportion of their inputs locally. This is of relevance for the future development of an indigenous sub-supply sector. It is generally hoped, particularly with respect to multinationals, that the longer they are established in a particular location the more closely integrated with the local economy they will become.

The survey results indicated that fifty three firms will increase the percentage they will source locally by varying amounts ranging from increases of 2% to 100%. Thirty eight firms indicated that they will not be increasing the local content of inputs while seven firms did not respond to the question.

Of the fifty three firms indicating that they would be increasing the percentage sourced locally twenty one were indigenous owned and thirty two overseas owned. The overseas category was comprised of nineteen US

firms, one UK, two German and ten 'Others'. German firms were by far the most reluctant to increase the proportion which they source locally with five of the seven respondents indicating that they will not. The comparable figure for indigenous firms was nineteen, being ten and four for US and 'Other' firms respectively.

A feature of the data was that a significant amount of the overseas firms which indicated that they would increase the proportion sourced locally employed more than 100 persons. Nineteen of these firms, thirteen from the US alone, indicated future plans to increase indigenous sourcing. Because of their size any increase in indigenous sourcing by these firms would have a very positive impact for the indigenous sub-supply sector.

Question ten (b) *If Yes, by what percentage*

This question sought to assess the potential impact to the local economy from any increase in the proportion of inputs supplied locally.

Table 8.2.12 examines the responses by nationality of ownership.

Table 8.2.12

EXPECTED PERCENTAGE INCREASE OF LOCAL SOURCING BY NATIONALITY OF OWNERSHIP					
Nationality	*0-29%*	*30-49%*	*50-69%*	*70% & over*	*NA*
Irish	6	1	2	4	19
US	9	0	4	3	10
UK	1	0	0	0	0
German	2	0	0	0	5
Other	3	1	0	2	4

The majority of firms indicated that they will increase their percentage of local inputs by 0-29%. The total number of firms in this range was twenty one, six indigenous, nine from the US, one UK, two German and three 'Others'. Both an indigenous and one 'Other' firm indicated an increase of 30-49%. Six firms indicated a 50-69% increase, two indigenous and four US. The 70% & over category consisted of four indigenous, three US and two 'Other' firms.

There are several variables involved which one must consider in interpreting these results, however. The degree to which the local economy benefits from an increase in local sourcing is dependent on three factors, the initial degree of local sourcing, the projected increase and finally the size of the firm. Obviously the larger the firm, the higher the initial degree of local sourcing and the greater the projected increase the more the benefit to the economy. Different combinations of these will yield different rates of

return. It may well be the case that firms indicating that they will increase their local sourcing content by 0-29% may contribute more than firms indicating an increase of over 70%.

All six of the indigenous firms indicating that they will increase local sourcing by 0-29% employed less than fifty persons. Two firms who at present source under 10% locally indicate a projected increase in this region, one each in the 10-29% and 30-49% categories while one which sources 50-69% will increase its proportion by this amount. Since these firms are small these projected increases, remembering that they may not occur at all, may not account for any realistic substantial gain to the local economy.

Although a significant proportion of overseas firms do not, in general, source to any substantial degree locally those that do tend to be large. The majority of these firms, especially those of US origin, have indicated that they will increase the percentage sourced locally by a considerable proportion. Potential gains from these firms could be significant, though they are by far the minority.

In summary it appears that while a significant proportion of firms have indicated that they will increase their local sourcing content the overall potential gains may not be significant. Gains are likely to accrue only through those larger overseas firms, who at present source a significant

proportion of their inputs locally, increasing the percentage of local content in the final product, though realistically this can only be by a limited amount.

Question ten (c) *If No, please state principal reason(s)*

By nationality of ownership the survey results were quite similar. Almost all firms indicating that they would not be increasing their local sourcing content noted that unavailability of indigenous suppliers was the primary reason. All except three of the indigenous electronics firms indicated this factor. Two of the three indicated that high costs were a disincentive while the remaining one noted delivery problems and poor quality as a reason.

Apart from one firm all US respondents indicated unavailability as the problem, the exception noting that the weak dollar was responsible. German firms indicated that the primary reason for not increasing the proportion sourced locally was poor quality combined with problems associated with deliveries. One firm indicated that it purchased cheaper from a central purchasing department in Germany while one indicated again unavailability as the problem.

In the 'Other' category one firm indicated that its local purchases were already almost 100%, while another indicated that the quality of imported supplies was far superior in quality than those which could be manufact-

ured in Ireland. From the respondents comments it would appear that there appears to exist possible market niches which could be exploited by indigenous firms providing they can supply goods at sufficiently high quality and at competitive prices.

Identification of these niches may provide a stimulus for the further growth of an indigenous electronics supply sector. It remains uncertain, however, what the size of these market niches are and whether or not they can be commercially exploited.

Question eleven *Do you import inputs from an affiliated company*

Given the relatively small size of indigenous firms it is expected that they will not import any significant proportion of their inputs from affiliated companies. Chapters three and six have noted that a considerable proportion of inputs are imported by overseas firms. Various reasons exist, ranging from the vertical integration of electronics multinationals to the non-availability of adequate indigenous suppliers. The table below indicates the propensity for importation from affiliated companies by nationality of firm ownership.

Table 8.2.13

NATIONALITY OF OWNERSHIP BY IMPORTATION FROM AFFILIATED COMPANIES		
Nationality	*Yes*	*No*
Irish	3	39
US	22	8
UK	1	-
German	7	1
Other	13	2

Expectations of both indigenous and multinational behaviour are verified by the survey results. Fifty of the respondents, a considerable proportion indigenous, indicate that they do not import inputs from affiliated companies. Three indigenous firms import from these companies, the remaining thirty nine indicating that they didn't. Two firms did not respond to the question. Overseas firms demonstrated quite different trends. Forty three out of a total of fifty four imported from affiliates. Twenty two of the US owned firms, the one UK, seven German and thirteen 'Others' all imported from related companies.

Question twelve *What percentage of inputs are imported from affiliated companies*

The survey results indicate that the degree of importation from affiliated companies is much lower that the percentage exported to them. The data indicates that the majority of firms import 10-29% of inputs from their

affiliates. Ten firms imported in the range 30-49%, seven between 50 and 69% while six firms each imported either 10% and lower or 70% and higher. One firm of each nationality, except 'Others', did not respond to the question.

The survey results varied quite considerably, as table 8.2.14 indicates, by nationality of ownership.

Table 8.2.14

NATIONALITY OF OWNERSHIP BY PERCENTAGE IMPORTED FROM AFFILIATED COMPANIES					
Nationality	*Under 10%*	*10-29%*	*30-49%*	*50-69%*	*70% & Over*
Irish	-	1	1	-	-
US	3	9	7	2	-
UK	-	-	-	-	-
German	-	2	-	1	3
Other	2	3	2	3	3

One each of the indigenous firms imports 10-29% and 30-49% of their inputs from affiliates. The latter firm employs less than 50 persons and does not export to an affiliated company. The remaining firm is larger, employing 100-149, and exports to an affiliate.

A surprising feature of the data is that no large US firm imports over 50% of its inputs from affiliates. This may be compared with twelve firms which

indicate that they export the same proportion to affiliates. The highest proportion imported is from two firms, employing 50 or less, and is 50-69% for each of them.

An almost equal number of larger US firms, i.e those employing 150 or more, tend to import either between 10-29% or 30-49% from affiliates. Seven firms in all, four employing 150 or more, import between 30 and 49 percent from affiliates. Nine firms, five employing more than 150, import between 10 and 29%. The remaining three firms import under 10%.

German and 'Other' firms indicate that they import significantly more from affiliated companies than US firms. The data indicates that these firms are more vertically integrated than their US counterparts. All, except one, of these firms both imported and exported to affiliated companies. Combining the two nationalities nine import under 50% while three export under 50% to affiliated companies. Four German firms import over 50% from affiliates, six exporting the same amount to affiliates. Eleven of the 'Other' firms export over 50% to affiliated companies, the data above indicating that six import from them.

Question thirteen *In five years time do you think that you will be employing (a) more than at present, (b) less than at present, (c) the same, or (d) are unsure*

Sixty eight of the respondents indicated that they will be employing more than at present in five years, six expected fewer to be employed, fourteen indicated the same while ten were uncertain. The survey results are broadly similar when compared by nationality of ownership.

Table 8.2.15

PROJECTED TRENDS OF EMPLOYMENT BY NATIONALITY OF OWNERSHIP				
Nationality	*More Than At Present*	*Fewer Than At Present*	*The Same*	*Not Sure*
Irish	33	4	2	4
US	21	1	6	2
UK	-	-	-	1
German	4	1	2	1
Other	10	-	4	2

Firms of all nationalities are generally optimistic about future employment. Thirty three indigenous firms out of a sample total of 43 expect employment to increase. Two firms expect similar levels while four are not sure. Four indigenous firms are pessimistic about future employment. An interesting feature of these four firms is that three are small, employing less than 50 persons, perhaps indicating the many known problems facing small industry.

Twenty one US firms expect to be employing more in five years with six indicating the same and two not sure. The comparable figures, for the more

cautious German firms, is four, two and one respectively. In the final category, comprised of 'Other' firms, none expect to be employing less than at present, ten expect to be employing more, four the same and two were not sure.

Only two of the respondents from a total of fifty five overseas firms expect employment levels to decline. One of these is US owned, employing 100-149, while the other is German, employing 50-99. Increased competition, from a variety of sources, resulting in lost markets or a decline in Ireland's relative country specific advantages for overseas investments may be responsible for this apparent pessimism. Rationalisation of operations may, of course, be another reason. The fears expressed, as outlined in Chapter four, of impending rationalisation, particularly with respect to US operations because of the Single Market, the effects of anti-dumping measures or Spain's entry to the EC would appear for the present unfounded.

One of the other fears related to overseas investments is that the products manufactured may well be in the latter stages of the product life cycle. This is because much of the investment took place immediately following Ireland's entry to the EC. As these products become obsolete, the last stage of the plc, it is feared that multinationals would cease operations in Ireland. The survey results, however, do not indicate any such levels of pessimism although it is questionable if multinationals would indicate if they are planning any reduction or cessation of operations.

Question fourteen *What has been the percentage change in employment in your firm since its formation*

A considerable proportion of both indigenous and overseas firms have increased in size. Twenty nine of the former and thirty four of the latter indicated that employment increased. The survey results was comprised of thirty four indigenous an forty six overseas firms respondents.

Only two indigenous firms reduced their employment levels, by 27% in one firm employing 150 & over and by four fifths for a much smaller firm, employing less than 50. Three firms indicated no change in the numbers employed.

Twenty US firms increased in size while approximately a fifth declined with two others remaining unchanged. The comparable figures for German and 'Other' firms was an increase by five and eight firms with one and two of the remaining firms indicating no change respectively. One firm in each of these categories declined.

US firms have accounted for the greatest employment loss. Firms employing 50-99, 100-149 and 150 & over declined by 30%, 50% and 80% respectively. All of the remaining overseas firms which reduced their workforce employed 50 persons or less.

While US firms may have accounted for the most substantial share of employment loss they were also responsible for the greatest source of employment increase. Nine firms, employing over 100 persons, increased their numbers employed by at least 100%, over half of which increased in size by 400% or more. Two indigenous, two 'Other' and one German firm also increased by this amount, although in general they employ significantly less than the larger US firms.

Since the majority of managers, especially those from overseas firms, have indicated that they expect future employment to increase combined with relatively few firms having declined it appears that one could be generally optimistic about future growth.

Question fifteen (a) *What is the nationality of ownership of your firm*

The survey results consist of forty three indigenous owned firms, thirty US owned, one UK, eight German and finally sixteen 'Other' firms. The 'Other' firms category consists of five Japanese firms, two French and Swiss, and one each from Norway, the Netherlands, Canada, Italy, Spain and Sweden. The remaining firm was part US and Korean owned.

Although there is quite a substantial number of indigenous firms in the sample overseas firms account for, as expected (see Chapter five & Question five), the most substantial proportion of employment with the US

dominating especially in the data processing industry.

Question fifteen (b) *If Irish, was your firm formed as a result of a spin-off from an overseas firm*

An aspect of overseas investments in Ireland in the electronics industry is that when subsidiaries are established the parent firm does not locate any significant proportion of its key business functions at subsidiary level. Production facilities are of the lower skilled assembly type with most research or business decisions taken outside the country. This reduces the capacity for prospective entrepreneurs obtaining the necessary skills to successfully establish their own firm.

The survey results, however, indicated a surprising number of indigenous spin-off firms. In total ten of the respondents indicated that their firm was formed through a spin-off from an overseas company. This represented approximately a quarter of the total indigenous respondents. One would have expected that most of these start ups would be generally small scale operations. Once again the results were surprising with two firms indicating that they employ 100-149 persons while three others indicated employing 150 persons and over. The remaining five employed less than 50.

This would seem to indicate that multinationals have, contrary to expectations, caused the establishment of some presumably strong, by virtue of

their size, indigenous spin-off firms. Further research, however, indicated that a significant proportion of the firms were formed through other means rather than entrepreneurial start ups.

Five firms were formed through management buy-out's (MBO's), one each through a take-over, a sell-out and a purchase from a receiver. Just two of the firms were actually formed through entrepreneurial start-ups. Follow up enquiries indicated that both firms formed through the latter employed considerably less than fifty persons. As discussed in Chapter seven, section six, access to IDA and SFADCO data banks was obtained so that an examination of those firms that did not respond to the survey could be made. This revealed that a further three firms were formed through entrepreneurial start-ups, again with the common characteristic of each employing much less than fifty persons.

It would be an interesting exercise for further research to be conducted into various characteristics of these entrepreneurs. Such a study could examine a number of features of the firm ranging from the motivation for the start-up, the source of finance for the company and primary market locations. A description of ther useful questions is outlined in Appendix 'F'.

Management buy-out firms employed the most significant numbers, with all of them employing more than 100 persons. Research showed that those firms formed through MBO's were generally given short term contracts

with the original parent companies. After this period it is generally up to the firm to generate new contracts. This mechanism has provided the multinational with the capacity to leave Ireland with minimal 'fuss' though it remains uncertain if these MBO's have the capacity to create new markets and ultimately survive.

Question sixteen *Do you have a formal R & D department in Ireland*

Chapter three indicated that multinationals predominantly carry out the bulk of their R & D efforts in the home country. Alternatively given the very short product life cycles of electronic components it is expected that a very high proportion of indigenous firms would be forced to carry out some form of research.

The exceptions to this rule would be either where standardised components in the passive electronics sector are manufactured or where indigenous firms operate with some form of licensing or franchise contract. As discussed in Chapter three, however, multinational electronics firms are unlikely to license their products so it is unlikely that any significant proportion of new products will be obtained in this way.

Table 8.2.16 below details the number of firms indicating that they operate research facilities by nationality of ownership.

Table 8.2.16

RESEARCH AND DEVELOPMENT DEPARTMENT BY NATIONALITY OF OWNERSHIP		
Nationality	*Yes*	*No*
Irish	29	14
US	14	16
UK	-	1
German	3	5
Other	4	12

The data indicates that an almost equal number of firms have R & D to those that do not. Fifty firms have some form of research department while forty eight do not. Indigenous firms, as expected, account for the most substantial number of research facilities, the figure being twenty eight. Of the fourteen indigenous firms without any research facilities ten employ less than fifty persons. A substantial proportion of these firms operate in the standardised sub-component sector where product life cycles are generally quite long requiring less investment in research.

A surprising feature of the data is the large number of US firms indicating that they have some form of research facility. Almost half, fourteen out of thirty, conduct some form of research though it is expected, according to multinational behaviour, that this will mostly consist of the lower skilled product development rather than primary research. (see Chapter three) Of the remaining overseas firms seven indicated that they conduct research,

comprised of three German and four 'Others', while eighteen do not. Firms in the 'Other' category showed a greater propensity of not conducting research.

Question seventeen *Would you describe your R & D activities as predominatly concerned with primary research or development*

Multinational behaviour suggests that firms generally conduct their research in the home country. Where research is carried out abroad, however, it is generally not primary or basic research but more so the development or adaptation of existing products.

Research laboratories which are established in the host county generally act in a support capacity only and are not involved in the more fundamental aspects of research. Alternatively indigenous firms have to carry out some forms of basic or primary research to develop marketable products. They must also establish development laboratories to adapt existing products.

It is expected, therefore, that the survey results will indicate a significant proportion of overseas firms not carrying out primary, but rather developmental research. Indigenous firms are expected to carry out both primary and developmental research. Table 8.2.17 provides a summary of the results.

Table 8.2.17

PRINCIPAL RESEARCH ACTIVITIES BY NATIONALITY OF OWNERSHIP				
Nationality	*Primary Research*	*Develop-ment*	*Primary Research & Dev.*	*No Dept.*
Irish	9	15	5	14
US	1	11	1	16
UK	-	-	-	1
German	-	2	1	5
Other	-	4	-	12

A feature of the table, which is expected, is the lack of primary research carried out by overseas firms. Two of the US firms, out of a total of thirty which have invested, indicate that they carry out any primary research. Just one other German firm indicated that it carries out primary research. One US firm did not respond to the question.

As discussed previously those overseas firms which do conduct research are expected to be involved in developmental work. Twelve of the US firms, out of a total of thirteen and all of both the 'Other' & German firms fit into this category. These results are precisely what the theory of multinational behaviour would suggest.

The results for indigenous firms are quite dissimilar but nevertheless as expected. Fifteen firms indicated that they carried out developmental

research while nine, substantially higher than the overseas total, conducted primary research. Five firms indicated that they carried out both. Those firms which do conduct primary research generally operate in either the data processing or active components, semiconductor manufacture and so on, sectors. These sectors are the most technically innovative therefore requiring the most primary research.

Lack of investment in primary research by overseas firms in Ireland adversely affects the capacity of the industry to generate suitably qualified technically orientated individuals who may have prospective entrepreneurial talents.

Another consequence of multinationals not establishing research facilities is that, by not locating key business functions in the host country, they are effectively extremely mobile and can easily close operations. Their mobility and the fact that they do not increase the general overall skills profile of the workforce to any significant degree obviously has negative effects on industry in general. If, for example, multinationals close their operations they leave behind no increase in the local skills profile which may be of use to either other existing firms or persons wishing to establish new replacement firms.

Question eighteen *How many persons are engaged in this research*

Given that R & D is not a priority for overseas firms, combined with the limited research budgets of indigenous firms, the expectation is that the average size of associated departments will also be small.

Of the fifty firms conducting R & D seventeen employ 1-3 persons, fifteen each 4-6 and 10 & over while two employ 7-9 persons. One firm did not respond to the question. While a significant proportion of firms indicate that over 10 persons or more are employed in the research department this figure was found generally not to increase beyond 15.

Table 8.2.18 presents a summary of the data by nationality of ownership.

Table 8.2.18

NUMBERS EMPLOYED IN RESEARCH DEPARTMENTS BY NATIONALITY OF FIRM OWNERSHIP					
Nationality	*1-3*	*4-6*	*7-9*	*10 & Over*	*No Research*
Irish	11	11	2	5	14
US	4	2	-	7	16
UK	-	-	-	-	1
German	1	1	-	1	5
Other	1	1	-	2	12

A feature of the data is that research departments, more so for indigenous firms, are small. Of the twenty nine indigenous firms conducting R & D only five employ more than ten persons. Two employ 7-9 while eleven firms each employ 1-3 and 4-6 persons.

US research facilities tend to be proportionately larger with seven firms employing 10 & over, four employing 1-3 while two employ 4-6. The comparable figures for German firms is one firm each employing in the 1-3, 4-6 and 10 & over categories. Two of the 'Other' firms employ 10 & over while one each employs 1-3 and 4-6 persons.

There was considerable variations in the sizes of both primary and developmental research laboratories. Both of the US firms who indicated that they performed primary research employed 10 persons or more. Three indigenous firms, carrying out similar research, employed 1-3 while seven employed 4-6, the one German firm also fitting into this grouping, while two each employed 7-9 and ten and over.

Indigenous firms conducting product adaptation or development tended to be smaller than those of overseas firms. Ten indigenous firms employed 1-3 persons, with a similar number employing four and over. Only three firms, or less than a third of this, employed ten persons or more. In comparison six of the overseas firms employed 1-3 persons while thirteen, nine of these employing ten and over, employed more than four.

Question nineteen *Out of this total how many have technical diplomas, Science, Masters or PhD's*

Given the degree to which product adaptation/development occurs, combined with the relatively small size of research departments, the expectation is that a considerable proportion of those persons employed in research departments will have technical diplomas rather than belonging to the higher skilled professional groupings, that is those possessing primary or post-graduate degrees.

If those employed in research are generally conducting very basic research only combined with they themselves having relatively low technical qualifications then the capacity for entrepreneurial spin-offs is greatly diminished. Even if firms employ personnel with higher qualifications the capacity for spin-off 'start-ups' may not be greatly enhanced because of the nature of the research operations.

Table 8.2.19 below provides a breakdown of the numbers of research personnel by their associated qualifications.

Table 8.2.19

QUALIFICATIONS OF RESEARCH PERSONNEL BY NUMBERS EMPLOYED				
Number Employed in Research	*Number of Companies by Technical Qualifications of Research Staff*			
	Technical Diploma	*Science Degree*	*Masters Degree*	*PhD*
1-3	28	19	18	11
4-6	4	11	3	2
7-9	1	1	1	-
10 & Over	10	11	4	-

The data indicates that personnel with technical diplomas and primary science degrees account for the most substantial number employed. Forty three firms indicate that they employ, in varying amounts, persons with technical diplomas. The comparable figure for science degrees is forty two. A significant proportion of these firms employ large numbers of persons with these qualifications, with ten and eleven firms employing 10 or more persons with technical diplomas and science degree respectively.

As expected the numbers of persons employed having either Masters Degrees and PhD's is significantly less. Twenty six firms indicated that they employ persons with the former qualifications while only thirteen firms employ those with the latter. No firm indicated that it employed over 7 persons with PhD's, the corresponding figure being five for persons with Masters degrees.

The majority of those with technical and primary degrees work in developmental research. Of the forty three firms indicating that they employ persons with technical diplomas twenty eight employ them in developmental research departments alone. Seven employ them in departments carrying out both primary and developmental research while eight firms conducting primary research employ them, probably in a support rather than in a 'hands-on' capacity.

Similar trends occur for those employing persons with primary degrees. Twenty five firms employ them in developmental research alone while six employ them in departments conducting both primary and developmental research.

It could be hypothesised that the higher the qualification of the employee, together with appropriate experience, the greater is their capacity to establish their own firm. Though exceptions exist it is more likely that persons with post graduate qualifications, will establish their own firm rather than those which have technical diplomas.

The situation is more complicated since although a person may have higher qualifications they must operate in an environment which is conducive to allowing them to develop their entrepreneurial talents. If persons with higher qualifications work in enterprises which only carries out the most basic of research or developmental work then they cannot gain sufficient

experience which would enable them to form their own firm. Persons working in developmental research may not also have the ability to generate new marketable ideas since multinationals would generally have the patent rights to any new products or processes. Therefore it is from persons with primarily post graduate degrees working in establishments conducting primary research that spin off firms develop.

The survey results indicate that of the thirteen firms employing persons with PhD's only five conduct primary research, the larger number being involved in developmental research. With respect to the capacity for indigenous spin off firm formation the survey results indicate a worse case scenario for those persons with Masters degrees. Only six firms with employees having Masters degrees conduct primary research with the majority, eighteen firms, conducting developmental research only. Two firms indicated that they conducted both.

If one uses the criterion that spin-off firms originate from those persons with post graduate experience working in primary research then one can immediately see that the capacity for spin-off firm formation is extremely low. A realistic appraisal of the data would indicate that of the survey respondents approximately a maximum of six firms could act as spin-off incubators.

Of course not all persons working in these establishments would contemplate forming their own firm. These characteristics all lead to the conclusion that the capacity for entrepreneurial spin-off firm formation is extremely low. This explains the research findings of question fifteen (b).

Question twenty *How much, as a percentage of sales, is spent on R & D*

Since a very high proportion of research is geared towards developmental rather than the significantly higher costing primary research it is expected that the percentage of sales devoted to R & D will be quite low. Indigenous firms are expected to show higher percentages of sales devoted to R & D since they carry out proportionately more primary research than overseas firms.

Table 8.2.20

NATIONALITY OF OWNERSHIP BY PERCENTAGE OF SALES SPENT ON R & D				
Nationality	*1-2%*	*3-5%*	*6-8%*	*9% & Over*
Irish	5	5	5	14
US	2	3	2	7
UK	-	-	-	-
German	1	-	-	2
Other	-	-	1	3

The data indicates that eight firms each spent 1-2%, 3-5% and 6-8% of sales on R & D. A higher number, twenty six firms, spent 9% or more.

Five indigenous firms each spend in the 1-2%, 3-5% and 6-8% of sales on R & D. The comparable number of firms in this range for the US is two, three and two. Of the remaining firms one German and one 'Other' spend 1-2% and 6-8% of sales on R & D respectively.

It was expected, from previous studies, that the majority of firms would have spent between one and five percent of sales on R & D. The data, however, indicates otherwise with a significant proportion spending 9% or more of sales on research. Indigenous and US firms account for the most substantial number of those in the highest category. Fourteen and seven indigenous and US firms, almost half in each of the respective cases, spent 9% or more on R & D. Two of the three German firms and three of the four 'Other' firms were in this category also. The high numbers of firms indicating that they spend this proportion of their sales on R & D is unusually high and warrants closer examination.

The Sectoral Development Committee indicated that in 1982 indigenous electronics firms spent approximately 3.8% of sales on R & D, the comparable figure for overseas firms being 1.4%.[225] This is substantially lower than what they survey results indicate.

Examination of the data indicates that of the seven US firms indicating that they spend over 9% of sales on R & D just one is engaged in primary

[225] SDC No.8, 1985, p77

research alone while one conducts both primary and developmental research. One of the German firms conducts primary research while none of the 'Other' firms do. All of the remaining firms conduct developmental research only. This very low proportion of firms indicating that they do not undertake the much more complex and generally extremely expensive primary research would appear to indicate that the survey respondents have overestimated their expenditures on R & D.

Unpublished data from Eolas would also seem to concur with the hypothesis that indicated expenditures are overly high. The data indicates that the average overseas expenditure is in fact 5% of sales.

Almost half of indigenous respondents indicate that they spend over 9% on R & D. While the percentage of sales spent on research is significantly higher than indicated in the SDC report, and is surprising, it may not unlike overseas firms be an overestimation. Data, again calculated from an Eolas survey, indicates that the actual expenditure figure is 11%.

Two reasons can be suggested for this apparently high expenditure. Of the fourteen firms nine are engaged in primary research while the remainder conduct developmental research. Since a high proportion of indigenous firms conduct primary research, not having the ability to buy intangibles such as knowledge from a parent firm, it is expected that research expenditures will be high. The second reason is based on a more indirect

8.3 Conclusions

The electronics industry in Ireland has shown a significant growth performance in the decades following Ireland's entry to the European Community. The average percentage change in the numbers employed since 1973 is an increase of 185%. In comparison average employment in manufacturing industry fell by 11%. In two of the three electronics subsectors, data processing and radio & television receivors, practically all of this growth has been fuelled by overseas investments. The only significant presence of indigenous firms is as manufacturers of the more standardised electronics subcomponents.

US owned affiliates account for the most substantial proportion of persons employed. Their presence is especially strong in the data processing sector. The motivation for investment by these firms, as is the case with all overseas firms, is driven by an array of fiscal and financial inducements together with proximity to the tariff protected European Community Market. US firms in particular have invested for the combined reasons of establishing export platforms to this market and also to avail of Ireland's low rate of corporation tax.

A general trend of overseas production facilities is that they conduct labour intensive manual assembly type operations only. From an Irish perspective a negative feature of these investments is that key business functions, such as research and development and marketing departments, have not been

transferred to Ireland. Such characteristics are in part explainable with respect to the motivation for investment. If, for example, a firm has invested in order to particularly avail of the low rates of corporation tax, as has been suggested in Chapter four, then it would not have any incentive to locate primary business functions in Ireland as this would have the effect of reducing the pre-tax profits of local subsidiaries. Obviously this would be contrary to corporate policy since it is in their interests to maximise profits in Ireland.

The failure to locate such functions in Ireland has severely limited the capacity for entrepreneurial start-ups. In effect, persons working in these organisations cannot gain the experience necessary to consider establishing their own firm. As the survey results and further research indicated just five firms were formed by individuals directly leaving the subsidiaries of multinational corporations and establishing their own firm.

A general characteristic of these firms is that they employed relatively small numbers, vis 5-25 persons, thus raising a question over their capacity to provide significant future contributions to the economy. Although beyond the scope of this study, it would be an interesting exercise to conduct an examination of these firms to gain an insight into various trends of their behaviour. Appendix 'F' outlines a possible questionnaire format for such an investigation.

Over the past two decades there has been various government initiatives adopted to entice multinationals to locate higher business functions, such as research facilities, in Ireland. These policies, however, appear to have been largely ineffective. In general incentives have influenced companies to only conduct what might be termed their lower skills intensive activities. One example is the establishment of product development rather than primary research facilities.

Indeed the survey results indicate that in total just three overseas firms conduct any primary research in Ireland. This failure to integrate sufficiently with the local economy could result in future problems because multinational production facilities such as these tend to be extremely mobile and can easily be closed or their operations scaled down. Therefore, if the economy is to maximise the benefits of overseas investments it would appear that there must be further efforts by policy makers to increase the likelihood of such firms establishing key business functions in Ireland.

Given the increased international competition for overseas investments the development and implementation of such policies may be extremely difficult to achieve. If, as is sometimes suggested, the government is to change its 'no strings attached' policies towards overseas investments and require multinationals to conduct a specific proportion of their research locally, it could result in a reduction of Ireland's attractiveness for foreign investors. Subsequently this may result in their locating their production facilities

elsewhere. Furthermore, even if the government were to provide higher levels of grants in order to attract multinationals to conduct more sophisticated operations, such as R & D, it is likely that the net benefits to the firm might not be large enough to offset the potential revenue losses because of the corporation tax levied in Ireland. Even if it were more profitable for such firms to position R & D centres locally there may be various internal constraints, as indicated in Chapter three, for centralisation of these functions.

In summary it would appear that the capacity for new firm generation via persons working, and subsequently leaving, multinational research facilities is likely to remain extremely limited. However, while such indirect returns to the economy are low it would appear that direct benefits originating from export earnings are substantial. Every overseas firm indicated that they exported some proportion of their output with US firms accounting for the most significant proportion exported. Such high levels of exportation are to be expected given both the combination of the limited size of the indigenous market and the motivation for investment in Ireland.

Any evaluation of this contribution to the economy is complicated by the expected existence of profit switching transfer pricing, especially in the data processing industry. The survey results indicate that the levels of intra firm trade, especially in the proportion exported to affiliated companies, is very high. It is most prevalent in the US dominated data processing sector. As

is to be future significant secondary employment creation. Indigenous suppliers must strive towards expansion of their enterprises so that they can obtain advantages of economies of scale and drive production costs down. This will require a reassessment of current government and banking policies so that risk capital may be more readily available to the smaller firm. In turn these firms must place emphasis on quality control and their delivery supply networks.

It is sometimes commented that there is both an overestimation of the direct contributions, and relatively minimal cascade effects arising from overseas investment in the electronics industry. Nevertheless, such firms account for the largest proportion of total employment and are responsible for significant contributions to the economy via wages and salaries.

Since there is unlikely to be any significant growth in the indigenous electronics industry the question remains as to the projected long term stability of overseas investment. Because sectors such as computers & components are experiencing a major shake-out worldwide with the result of forecasts being revised downwards it is often commented that the future growth prospects within the industry in Ireland are limited. This combined with the tendency of overseas electronics firms to contract when mature would imply that there will not be any major increases in employment. The survey results indicate otherwise with a significant proportion of firms foreseeing future employment expansion. The results also indicate, as

outlined in Chapter four, that the fears of impending rationalisation of operations in the run up to the Single Market appear unfounded. Furthermore, it would appear that the entry of low labour cost locations, such as Spain, to the EC will not adversely affect future investment in Ireland.

It is also likely that the future harmonisation of EC fiscal policies, except in the underdeveloped regions such as Ireland, will increase this country's relative location specific advantages. One would expect that the levels of overseas investment in the electronics industry will continue to increase, though at a considerably slower rate than in the 1970's.

In summation one would have to say that while the dependence on multinational investment is in many ways an inferior alternative to a native electronics sector it is likely that the former will continue to dominate the industry unless the side effects of the small size of indigenous firms are addressed. If the onus for the development of an electronics industry in Ireland continues to be placed on multinationals one would realistically have to acknowledge that there will not be any future significant increase in their levels of overseas integration with the local economy. In a sense therefore the perceivable economic gains will be limited.

Appendix A

Defining the Multinational Enterprise

Defining the Multinational Enterprise

There are few modern economic institutions that have been the focus of more contention than the multinational corporation.[226] This none no more obvious when trying to establish a universally acceptable definition of the multinational enterprise. Hertner et al, for example, comment that there is no generally accepted definition of the MNE.[227] Lack of agreement, amongst both theorists and economists, in relation to the theory of the origin of the multinational can partly be attributed to this failure.

Four criterion have been determined, however, which may in fact be used to summarise most, if not all, of the definitions of the MNE.[228]

An operating definition one form of which is the ownership threshold definition - i.e a firm owns or controls income generating assets in more than one country.

A structural definition whereby multinationality is judged according to organisation of the company.

A performance criterion incorporating some relative or absolute measure of international spread (eg number of foreign subsidiaries, percentage of sales accounted for by foreign sales and so on).

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[226] Hood & Young, 1979, p1
[227] Hertner & Jones, 1986, p3
[228] Buckley and Casson, 1985, p2

A behavioural criterion based on the corporations degree of geocentricity.

Dunning has chosen to use a rudimentary approach to define the multinational. He simply describes them as firms that engage in foreign direct investment.[229] Others, however, prefer to use more complex definitions. Hood, for example, describes fdi as an investment involving the ownership and management of a foreign operation.[230] This definition is more complex than the former as it necessitates establishing what is meant by control of an operation.

The element of control over a foreign business has been described as the essential basis of the concept of the multinational.[231] The percentage of share capital, owned by a parent firm, is often a criterion used to establish what is necessary for control. Shareholding percentages are, however, a poor measure of control. For example, does 100% equity ownership guarantee absolute control? Alternatively if only a small proportion of equity capital is owned by the parent, does this necessarily imply a corresponding loss of control?

It is conceivable to write that there is no definitive relationship between ownership and control. Given that the multinational provides not alone money capital but also technology & management skills 100% ownership is not necessary to retain the control of an operation. Even total

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[229] Dunning, 1981, p3
[230] Hood, 1983, p1
[231] Hertner and Jones, 1986, p4

share-equity ownership by the parent does not even imply absolute control. If a host government can obtain a guarantee, as a precondition to allowing foreign investment, of the behavioural characteristics of multinationals operating within its jurisdiction the MNE can never, even if it owns all or a majority of the equity, have absolute control.

Critics of the previous definitions would argue that they neglect the multinationality of the firm. That is to say they neglect that for a firm to be considered truly multinational it must have affiliates established in a minimum number of countries. Caves uses this form of threshold condition. He defines the multinational as an enterprise that controls & manages production establishments or plants located in at least two countries.[232]

The Canadian government will consider a firm to be truly multinational only if it straddles at least four or five national economies. Vernon adds the additional requisite that subsidiaries must have access to a common pool of resources, both human and financial, have annual sales of over $100 million and have a certain amount of geographical spread.[233] Such definitions belong to one school of thought and may all be termed operating definitions.

Abdullah considers the problem of defining the MNE from another perspective. The question is posed as to what is not a MNE? He

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[232] Caves, 1982, p1
[233] Kirpalani, 1985, p58

hypothesises that a firm would not be considered multinational if its degree of international involvement in foreign operations does not figure in the management decision process.[234] Such a hypothesis is centralised upon whether or not the firms involvement in external activities (manufacturing, exports and so on) need management attention.

If these activities warrant managerial attention i.e are of crucial importance in the decision making process then the firm must be considered multinational irrespective of the proportion of revenue generated by external resources. The implications of this approach is that management decide on the multinationality of the firm. Specifically Abdullah states a company is not multinational if management does not consider it such.[235]

This mechanism for defining the multinational places, as with several other theories, perhaps too much emphasis on theoretical models. The core of Abdullah's hypothesis presupposes that little or no decentralisation occurs in the management decision making process and that no autonomy has been given to subsidiaries. In fact there are many circumstances which may cause this model to fail.

If we firstly consider a firm which is comprised of a series of autonomous subsidiaries operating in many countries. Consider also the reasonable possibility that, in total, these firms may contribute a higher proportion of

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[234] Abdullah, 1987, p3
[235] Abdullah, 1987, p3

total revenue than the parent firm in the home country. Since each subsidiary operates as autonomous units, an example being Johnson & Johnson subsidiaries, they may not fare in the day to day management decision making process in the parent country. They may, as in this case, have only to present annual reports.

A firm with this organisational structure, according to Abdullah's hypothesis, would not be considered multinational even though the subsidiaries contribute to a significant degree to the overall wealth of the firm. Their success could, in fact, be considered crucial to the survival of the firm. While it has limitations this theory is, however, probably more applicable to that of US MNE's where decentralisation of key business functions, which are crucial to the decision making process, is less likely than for MNE's from other countries.

Others schools of thought include the provision that a performance criterion must be reached for a firm to be considered multinational. That is, a certain percentage of the groups annual turnover must originate from a set minimum of sources outside of the home country. Abdullah comments that this is the most widely used way of defining a MNE.[236] Disagreements arise, however, while trying to establish what proportion of group turnover should originate from a subsidiary.

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[236] Abdullah, 1987, p3

A figure of 10% is often suggested as the minimal amount. Abdullah argues that such a proportion is generally too low to characterise a firm as an MNE. Much larger figures sometimes suggested which are as high as 50% have also to be dismissed immediately because most large US firms generally recognised as leading MNE's do not approach this proportion.[237] The generally accepted figure is in the range 25-30%.

The decentralisation of particular key business functions have sometimes been used as indicators to describe the multinationality of a firm. It is sometimes argued that for a firm to be considered multinational, facilities such as those associated with research & development, must also be transferred abroad.[238] Again the validity of such a requirement is open to question.

Centralisation of key business functions especially R & D has been shown, especially in the higher technology industries, to be an intrinsic characteristic of multinationals. Almost all research, especially in US multinationals, is carried out in the home country. Indeed Chapter three noted that not much more than 10% of such research work is carried out abroad by these firms even though many would generally be considered as multinationals. Such low levels of decentralisation of research facilities are also a characteristic of many Japanese enterprises, again many whom are often regarded as being multinational.[239] Furthermore by this criteria it

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[237] Abdullah, 1987, p3
[238] Kirpalani, 1987, p58
[239] Dicken, 1986, p199

could be argued that firms who invest in labour intensive areas, such as the developing countries, may not be strictly regarded as being multinational since virtually no research work is generally carried out in these locations. Again one would have to say that like so many others such a hypothesis has limited applications.

No one definition of the MNE seems immune from criticism. The exercise of rigorously defining the multinational seems a futile one, for with each individual definition there exists a series of associated 'pros' and 'cons'. Without a general theory of the multinational no one individual definition can be proven correct. The choice of definition may simply be left to the author. Indeed as Buckley and Casson comment definitions are not right or wrong, just more or less useful.[240]

In the Irish context the question remains as to what do we consider to be a multinational firm and what effects will problems in its definition cause this study. In effect the problem of rigorously defining the multinational did not cause any severe problems for this research. One problem did arise, however, but was more so related to the collection of data.

This thesis used data from a variety of sources, most notably from the IDA and Central Statistics Office. In most cases such data is available by nationality of firm ownership; in other words it is divided into separate 'overseas' and 'indigenous' industry classifications. Foley comments,

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[240] Buckley and Casson, 1985, p2

however, that "...it is not correct to treat overseas industry as equivalent to multinationals."[241] If we were to assume that overseas industry and multinationals in Ireland are one of the same thing then we would effectively overestimate the importance of multinationals as this definition would ignore those firms that were originally Irish owned and have subsequently fallen into the hands of foreign ownership. These firms are classified in Census and IDA industrial data as overseas owned firms, not necessarily the same thing as multinational subsidiaries.

Such distortions of data are probably more applicable to the traditional rather than the higher technology industries. Given the relatively weak nature of the indigenous electronics industry it is unlikely, with one exception, that there has been any significant number of take-overs which would result in the overseas element of Census data not being adjudged to be multinational. Therefore while aware of the limitations associated with such data sources it is likely that, for this study, they can be used as true representations of multinational electronics organisations.

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[241] Foley, 1991, p1

Appendix B

Survey Preliminary Letter of Notification

DUBLIN CITY UNIVERSITY
Ollscoil Chathair Bhaile Átha Cliath
DUBLIN BUSINESS SCHOOL
DUBLIN 9, IRELAND.
Telephone: 370077. Facsimile: 360830. Telex: 30690.

3/02/1992

(01) 7045188

Dear

I am a post graduate research student undertaking a study of the Irish electronics industry for the award of a Masters Degree in Business Studies at the above university. As part of my research I am conducting a comprehensive survey of the industry in Ireland. I shall, at a later date, be forwarding a questionnaire to your company and would greatly appreciate if you would respond to it. Should there be any question that you do not wish to reply to please feel free to ignore it. Please be assured that all information received will be treated with the utmost confidentiality.

If you have any comments or queries please do not hesitate to contact me at the above address or telephone number.

Yours sincerely,

William Wayne

Management Division
Head of Division: Professor P.M. Chisnall

Appendix C

Survey Covering Letter

DUBLIN CITY UNIVERSITY
Ollscoil Chathair Bhaile Átha Cliath
DUBLIN BUSINESS SCHOOL
DUBLIN 9, IRELAND.
Telephone: 370077. Facsimile: 360830. Telex: 30690.

10/02/1992

(01) 7045188

Dear Sir/Madam,

I am a post-graduate research student undertaking an economic study of the Irish electronics industry for the award of a Masters Degree in Business Studies at the above university. As noted in my previous letter, of the 3rd of February, I am conducting a comprehensive survey of manufacturing electronics firms operating in Ireland. The survey asks for your opinions on issues ranging from the primary reasons for investing in Ireland to your appraisal of the future for the industry.

I do no wish to impose on your time, but by completing the enclosed questionnaire you will provide a valuable contribution to understanding the trends of manufacturing firms, such as your own, operating in the electronics industry. If there are any questions which you do not wish to answer then feel free to ignore them. I would, however, ask you to answer as many questions as possible and return the questionnaire, completed or not, by March 4.

Please be assured that all information received will be treated with the utmost confidentiality. If you have any comments or queries please do not hesitate to contact me at the above address or telephone number. A copy of a summary of the survey results and conclusions will be available to you upon request. Thank you for your valued co-operation.

Yours sincerely,

William Wayne

Management Division
Head of Division: Professor P.M. Chisnall

Appendix D

Survey

DUBLIN CITY UNIVERSITY
Ollscoil Chathair Bhaile Átha Cliath
DUBLIN BUSINESS SCHOOL
DUBLIN 9, IRELAND.
Telephone: 370077. Facsimile: 360830. Telex: 30690.

CONFIDENTIAL

AN ECONOMIC ANALYSIS OF THE ELECTRONICS INDUSTRY IN IRELAND.

WILLIAM WAYNE

FEBRUARY 1992

Management Division
Head of Division: Professor P.M. Chisnall

Please leave Blank

Q1 What is the principal activity of your firm ?

(a) Manufacturing ☐

(b) Services ☐

Q2 In what year was your firm established in Ireland ? ☐

Q3 Which, if any, of the following factors influenced the investment decision in Ireland ?

(a) Fixed asset incentive packages ☐

(b) Tax concessions ☐

(c) Research & Development Grants ☐

(d) Supply of manual labour ☐

(e) Supply of skilled labour ☐

(f) Proximity to European market ☐

(g) Combination of above (please indicate) ☐

(h) None of the above (please specify) ☐

Q4 Were you involved in the investment decision ?

(a) Yes ☐

(b) No ☐

Q5 How many persons are employed by your firm ?

(a) Under 50 ☐

(b) 50 - 99 ☐

(c) 100 - 149 ☐

(d) 150 & over ☐

Q6 Does your company export ?

(a) Yes ☐

(b) No ☐

If No go to Q8

Q7(a) What percentage of sales is exported ?
(include exports to affiliated companies)

(i) Under 10% ☐
(ii) 10 - 29 ☐
(iii) 30 - 49 ☐ ☐
(iv) 50 - 69 ☐
(v) 70 & over ☐

Q7(b) What percentage of sales is exported to the E.C. ?

(i) Under 10% ☐
(ii) 10 - 29 ☐
(iii) 30 - 49 ☐ ☐
(iv) 50 - 69 ☐
(v) 70 & over ☐

Q7(c) Do you export to an affiliated company ?

(a) Yes ☐
(b) No ☐ ☐

If No go to Q8

Q7(d) If yes,
what percentage of total exports is exported to affiliated companies ?

(i) Under 10% ☐
(ii) 10 - 29 ☐
(iii) 30 - 49 ☐ ☐
(iv) 50 - 69 ☐
(v) 70 & over ☐

Q8 Of existing supplies of inputs what percentage are from indigenous sources ?

(i) Under 10% ☐
(ii) 10 - 29 ☐
(iii) 30 - 49 ☐ ☐
(iv) 50 - 69 ☐
(v) 70 & over ☐

Q9(a) Do indigenous suppliers provide inputs, or services, of sufficiently high quality ?

(a) Yes ☐

(b) No ☐

If Yes go to Q10(a)

Q9(b) If no,
What are the primary causes of dissatisfaction ?

(a) Poor Quality ☐

(b) High Cost ☐

(c) Maintaining delivery supplies ☐

(d) Other (please specify) _____ ☐

Q10(a) Does your firm intend to source a greater proportion of its inputs locally ?

(a) Yes ☐

(b) No ☐

Q10(b) If Yes,
by what percentage ☐

Q10(c) If No,
please state principal reason(s)

_____

_____

Q11 Do you import inputs from an affiliated company ?

(a) Yes ☐

(b) No ☐

If No go to Q13

Q12 What percentage of total inputs are imported from affiliated companies ?

(i) Under 10% ☐

(ii) 10 - 29 ☐

(iii) 30 - 49 ☐

(iv) 50 - 69 ☐

(v) 70 & over ☐

Q13 In five years time do you think that you will be employing

(a) More than at present ☐

(b) Fewer than at present ☐

(c) The same ☐

(d) Not sure ☐

Q14 What has been the percentage change in employment in your firm since its formation ?

(a) Increase (%) of ☐

(b) Decrease (%) of ☐

(c) No change ☐

Q15(a) What is the nationality of ownership of your firm ?

(a) Irish ☐

(b) U.S. ☐

(c) U.K. ☐

(d) German ☐

(e) Other (please specify) _____ ☐

Q15(b) If Irish,
was your firm formed as a result of a spin-off from an overseas firm ?

(a) Yes ☐

(b) No ☐

Q16 Do you have a formal R & D department in Ireland ?

(a) Yes ☐

(b) No ☐

If No go to Q21

Q17 Would you describe your R & D activities as predominantly concerned with

(a) Primary research or ☐

(b) Development/Adaptation of an existing product ☐

Q18 How many persons are engaged in this research ?

(a) 1 - 3 ☐

(b) 4 - 6 ☐

(c) 7 - 9 ☐ ☐

(d) 10 & over ☐

Q19 Out of this total how many have

(a) Technical Diplomas :

(i) 1 - 3 ☐

(ii) 4 - 6 ☐

(iii) 7 - 9 ☐ ☐

(iv) 10 & over ☐

(b) Science/Technical degrees :

(i) 1 - 3 ☐

(ii) 4 - 6 ☐

(iii) 7 - 9 ☐ ☐

(iv) 10 & over ☐

(c) Masters Degrees in Science :

(i) 1 - 3 ☐

(ii) 4 - 6 ☐

(iii) 7 - 9 ☐ ☐

(iv) 10 & over ☐

(d) PhD's in Science :

(i) 1 - 3 ☐

(ii) 4 - 6 ☐

(iii) 7 - 9 ☐ ☐

(iv) 10 & over ☐

Q20 How much, as a percentage of sales, is spent on R & D ?

(a) 1 - 2% ☐

(b) 3 - 5 ☐

(c) 6 - 8 ☐

(d) 9 & over ☐

Q21 Given the current downward trend in the global electronics industry how do you feel about the future of the Irish electronics industry ?

(a) Optimistic ☐

(b) Pessimistic ☐

(c) Unable to say ☐

Q22 Is there a particular reason which makes you feel like this (please indicate) ?

_____

_____

_____

_____

Q23 Is there any other factor which affects the development of the electronics industry ?

_____

_____

_____

_____

Thank you very much for your co-operation. Please place the completed questionnaire in the enclosed postage reply paid envelope and return by March 4.

This survey is confidential and your name will not be revealed in the research findings.

Appendix E

Survey Reminder Letter

DUBLIN CITY UNIVERSITY
Ollscoil Chathair Bhaile Átha Cliath
DUBLIN BUSINESS SCHOOL

DUBLIN 9, IRELAND.
Telephone: 370077. Facsimile: 360830. Telex: 30690.

05/03/1992

(01) 7045188

Dear

I am a post-graduate research student undertaking an economic study of the Irish electronics industry for the award of a Masters Degree in Business Studies at the above university. I am conducting a comprehensive survey of all manufacturing electronics firms operating in Ireland and have subsequently sent a survey to your firm, dated February 10th. The survey asks for your opinions on issues ranging from the primary reasons for investing in Ireland to your appraisal of the future for the industry.

While aware of your own time constraints, having not yet received a reply, I enclose another copy of the survey questions to be completed and returned, if possible, by March 13th.

Once again I wish to stress that if there are any questions which you do not wish to answer then feel free to ignore them. I would, however, ask you to answer as many questions as possible and return the questionnaire whether completed or not. Please be assured that all information received will be treated with the utmost confidentiality. A copy of a summary of the survey results and conclusions will be available to you upon request. Thank you for your valued co-operation.

Yours sincerely,

William Wayne

Appendix F

Suggested Format of Case Study Questions for Entrepreneurial Spin-off Firms

Suggested Format of Case Study Questions for Entrepreneurial Spin-off Firms

- Firm History, including

  (a) Age/Sex/Marriage Status of Entrepreneur(s)

  (b) Education/Previous work experience of entrepreneur

  (c) Previous position(s) held

  (d) Year Firm Established

- Motivation for Start-up

  (a) Was firm formed because of

  Perceived opportunity for new product

  Redundancy

  Desire for independence, control of future

  Uncertain career prospects

  Challenge

  Financial rewards

  Other

  (b) Did incubator firm provide any assistance in establishing your firm

  If Yes,

  Indicate type of assistance

- Number Employed

  (a) Past, Present employment

  (b) Breakdown of employment by occupation

  (c) Organisational structure

- Main Product Line

(a) Is there one product or a diversified product range

(b) Was/were the initial product(s) developed through

Own idea,

Development of existing product,

Assistance from incubator firm,

Licensing contract,

Franchise agreement, or

Scanning patent rights

(c) Is product line labour intensive (low value added)

or complex (high value added)

(d) Capacity for future development/modification of existing product

(e) Where are new products developed from

Own research

Licensing

University linkage

Other

(f) Is company operating in market niche or are there main competitors

- Key Business Functions

(a) Number of Marketing personel, Budget devoted to Marketing Department

(b) Size of R & D department, Budget

(c) Has there been any significant increase/decrease in budget devoted to each

- Market Location

(a) Where is your principal market(s) located

(b) About how many customers do you have

Of the five largest what proportion do you sell to each

(c) How do you sell your product (Approximately what proportion to each)

Wholesalers

Agents

Own sales force

Other

(d) Do you act as sub-supplier to multinational incubator firm

If Yes, What proportion of sales is sold to them

(e) Do you export

If Yes, What percentage of total sales are exported

About how many customers do you have

Of the five largest what proportion do you sell to each

How many firms do you export to and what percentage to each

How did you obtain this market

Do you intend to increase the proportion exported (Steps taken)

If No, Have you ever approached the export market

If yes, why have you not continued to export

If no, why have you not approached it

Do you forsee any export potential for your firm

- Start-up Finance

(a) How much was required

(b) Was initial finance obtained from

Bank Loan

Personal Savings

IDA Grants

Share Holders

Other Business

Cash From Relatives

Redundancy Pay

Credit from Suppliers

Finance Company

(c) Sources of Working/Fixed Capital (Bank Loan, Overdraft, Credit)

(d) Problems obtaining finance

- Role of Public Agencies in Assisting Firm

(a) Name of organisation giving assistance

(b) Type of assistance given

Financial (how much) &/or

Purely advisory service

- Problems encountered

(a) Types of problem

Size of firm

Lack of finance

Competition (Single market implications etc)

New product ideas

Lack of specialised workers

Taxation

Size of Irish market

Pitfalls for new firm

Most significant factor affecting the development of the firm

- Future

(a) Perception of growth prospects

(b) Plans for personal future involvement with the firm

(c) New markets

(d) Perceived changes in the industry (action to be taken)

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