

Estimates of New Foreign Manufacturing Employment in Ireland (1956-1972)

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Abstract: The penetration of Irish manufacturing by transnational corporations (TNCs) has been one of the most important economic developments of the past thirty years. This article estimates the levels of employment in new TNCs for each year from 1956 to 1972, using employment data for 428 TNCs in 1973 and a model of companies' employment-growth paths. Together with post-1972 IDA survey data, the estimates provide time series of TNC employment in each of ten manufacturing sectors as well as electronics, pharmaceuticals and health products. The evolution of the TNCs' share of total manufacturing employment is discussed.

I INTRODUCTION

The most striking feature of the Irish economy over the past 30 years has been the predominance of foreign corporations in new manufacturing investment. Foreign direct investment was the result of the post-war transition of the country's development regime from import-substituting industrialisation to export-led industrialisation. From the domestic point of view, export-oriented industry was seen to be a way out of economic stagnation and chronic trade deficits. From the external point of view, foreign investment in manufacturing was part of an emerging international division of labour, in which increasingly mobile capital drifted to more profitable locations away from the corporate headquarters. As early as 1950, the newly established Industrial Development Authority (IDA) sent delegations to the US to seek out foreign investors. When grant incentives were introduced in 1952 (extended in 1956) and export-profits tax relief in 1956, the incentives for export-oriented foreign

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capital to locate in Ireland were in place. The door was opened wide with a series of acts that reversed restrictions on foreign subsidiaries, and with the integration of Ireland into the "European economy".

With the exception of an aborted survey in 1960 and a completed one in 1966/67 (Survey Team, 1967), however, no attempt was made to quantify the extent of employment creation or investment by new foreign grant-aided firms until annual IDA employment surveys began in 1973. Even the 1966/67 survey failed to distinguish in most of its published findings between *foreign* and *domestic* new industry. Surveys by Ó hUiginn and McAleese provided detailed characteristics of the foreign and domestic manufacturing sectors in 1970 and 1973/74, respectively (Ó hUiginn, 1972; McAleese, 1977). Thus, there was a basis for a number of cross-sectional statistical studies of foreign vs. domestic industry. But longitudinal analysis of new foreign investment before 1973 has been lacking, because of the absence of time-series data regarding its extent.

Ideally, this information would be available by examining the pre-1973 *Census of Industrial Production* (CIP) returns for individual foreign companies. These returns include information on employment, gross and net output, wages and (dis)investment. However, there are legal and procedural restrictions on access to CIP files and on the disclosure by the Central Statistics Office of information relating to individual firms or small numbers of firms, which make such an invaluable study impossible at this time. The best alternative is to *indirectly* generate *estimates* of employment in foreign-owned manufacturing through demographic/statistical techniques.

In this article I will present estimates of employment in new foreign industry from 1956 to 1972. Together with IDA employment surveys, these will provide a time series of new foreign-sector employment throughout the period of export-led industrialisation. Estimates will be given for manufacturing as a whole, as well as each of the 10 manufacturing sectors that are commonly identified in the Irish literature.

Data of employment in new transnational corporations are important for two reasons. First, they indicate the degree of foreign penetration of Irish industry and, therefore, the degree of dependence of export-led industrialisation on foreign direct investment. Second, they are useful as a base for longitudinal studies of the socio-economic effects of foreign investment.

Of course, the employment shares of foreign vs. domestic industries are only one indicator of the relative importance of each sector. Employment shares do not correspond directly with asset positions, because foreign firms are generally more capital intensive, and because of differential factor-intensities among industrial sectors. Nor do they directly reflect gross or net output shares, because of differentials in labour productivity, profit rates and capital intensity. But employment *is* an important indicator of the size of various sectors, and has the advantage of being a relatively unambiguous quantity at any point in time.

The lacuna of data on the size of foreign and domestic industrial sectors has been detrimental to longitudinal studies of the effects of foreign investment. With the availability of employment estimates it will be possible, for example, to estimate the relation of the growth of foreign-owned manufacturing to changes in productivity, profits, and a number of other variables. It will also be possible to compare a series of variables, *per employee*, over time and among industrial sectors. A case in point is a recent study of the effects of the nationality of corporate ownership on strike activity, which was severely restricted by the absence of employment data by which to gauge the significance of strike frequencies at different times and in different sectors (Kelly and Brannick, 1987).

II DEFINITIONS

The concept "new foreign industry" is useful because it distinguishes export-oriented foreign subsidiaries from the older foreign companies that located in Ireland primarily to supply the domestic market. Several studies have shown that foreign subsidiaries which located in the 26 counties after the mid-1950s export nearly all of what they produce, while older subsidiaries generally export far less (for a review of these findings, see O'Malley, 1980). Therefore, the present estimates of employment in new foreign industry refer simply to all foreign-owned subsidiaries or companies which commenced production in 1955 or after. The overwhelming majority of these firms were grant-aided by the IDA, either through the "new industry" grants programme or other grants schemes.

Another set of industrial firms has a less clear-cut relationship to export-led industrialisation. These firms were established before the 1950s, but availed of "adaptation" or "re-equipment" grants that were made available in the 1960s to help firms "adapt to free trade". Many companies, particularly in the food-related industries, simply availed of these grants in order to rationalise their production in the hope of increasing profitability. Others "adapted" in the spirit of the programme, and became more export-oriented. Still, at least one analyst concluded that the poor export performance of these older firms scarcely changed between 1960 and 1973 (McAleese, 1978). Therefore, pre-1955 firms are not included in the present employment estimates, except in cases where entirely new production projects were set up. For example, an automobile company that closed its assembly operation and opened a new plant in its place is considered a "new industry" from the date the new plant started production. Another automobile company which merely "re-equipped" its existing plant is excluded.

III METHODOLOGY

I will estimate employment in new export-oriented foreign industry from 1956 to 1972, using three sets of information: (1) the employment population of each firm at the beginning of 1973, when the first IDA employment survey was conducted; (2) the date when production commenced for each firm; and (3) a model of an average growth path to "full employment". The methodology requires that reasonably accurate estimates of companies' employment histories, *on average*, may be made by assuming that 1973 represents their "full production" employment levels, and that they followed some typical employment growth path from their first year of production.

Such a method yields for each company a smooth, parabolic employment-growth path, toward a stable population that may continue for many years. It rules out cyclical downturns (upturns) as well as secular growth (decline) after the initial growth period. The most significant upturns, however, may be accounted for by using information on company expansions to divide a company's growth path between its initial investment and its expansions. The most significant downturns may be estimated by using information on closures of foreign projects during the 1955-73 period. If it can be shown (e.g., by comparison with the 1966/67 survey) that the resulting estimates of employment for new foreign industry *as a whole* are reasonably accurate, then it can be assumed that the sectoral estimates are reasonably accurate. These assumptions are given further weight by the fact that the years involved were a period of relatively stable growth in world-wide foreign direct investment, with the first major contractions arising in 1974/75 as a result of the international recessionary crisis.

The 1973 employment data are from the first IDA employment survey, as amended in subsequent years to fill in missing data.¹ The first complete survey was conducted in 1978, but preceding surveys are *near* complete and are reasonably accurate. The surveys code industrial *projects* — i.e., each individual factory, not just firms — by nationality of ownership, industrial sector, and types of grant aid (if any) received from the IDA. The 1973-82 surveys ascertained each company's employment during January of the survey year. Later surveys covered employment in November of the preceding year. I will follow IDA precedent and estimate employment at the *beginning* of each year from 1956 to 1972, although the estimates could be considered as the *end* of each year from 1955 to 1971.

The first year of production of each new foreign firm was identified from several sources. Most companies appeared in 1969 and 1972 IDA lists of principal foreign-owned manufacturing projects (IDA, 1969 and 1972). Some of the few remaining companies were identified by unpublished information from the

1. The versions used by the author were compiled by the IDA in 1980 and 1986.

IDA. Others were dated from the first year they received grants, as published in the annual reports of the IDA and An Foras Tionscail (the Grants Board). The start-up date for a few companies in the Shannon Industrial Estate was derived from annual reports of the Shannon Free Airport Development Company (SFADCo). Finally, a handful of remaining companies were dated from newspaper articles. The last source was particularly useful for excluding pre-1955 firms that were incorrectly labelled "new industry" by the IDA. Most of these were Irish companies that failed and were taken over by foreign companies (that received IDA new industry grants) after 1973. In the end, 387 post-1955 foreign manufacturing projects were identified as extant in 1973. Their distribution is given in Table 1.

Table 1: *Distribution of New Foreign Projects by Industrial Sector (1955-73)*

<i>Sector*</i>	<i>Projects Extant in 1973</i>	<i>Projects Failed by 1973</i>	<i>Projects Not in Study</i>
Food	31	3	—
Drink	2	—	—
Textiles	49	6	3
Clothing	45	2	1
Wood and furniture	9	—	1
Paper and printing	12	—	—
Clay and cement	12	—	—
Chemicals	36	4	2
Metal products	124	11	3
Other manufacturing	67	3	2
Total	387	29	12

*"Clay and cement" includes cement, ceramic and clay products. "Metal products" includes preliminary processing of metals, metal articles, mechanical engineering, tools, computer and data processing equipment, electrical engineering and vehicles and related products. "Other manufacturing" includes plastics, rubber, scientific instruments, health products, leather and tanning, and toys and sports equipment.

Closures

In addition, 41 firms that located in Ireland between 1955 and 1972, but which did not survive until 1973, were identified. Of these, "full employment" levels for 29 were identified from an unpublished list of companies in Ireland that was compiled by A. Pakenham-Walsh and F. Drechsler of the Department of Business Studies, Trinity College, Dublin. Their dates of failure were

identified from several sources, including newspaper reports and IDA publications. Closures of many projects were dated by identifying the year when the project stopped receiving its IDA grants, although significant grant moneys were still outstanding. There were only 12 projects, then, for which there were no employment data, and these have been excluded from this survey. These censored projects, however, were all quite small, as confirmed by the amounts of IDA grants received before closure. In addition, several were non-manufacturing projects that were misclassified by the IDA.

Expansions

In several cases, new foreign firms had major expansions during the 1955–73 period. Expansions were identified in the IDA lists of principal foreign-owned projects. These firms' 1973 employment totals were allocated between their start-up and expansion by two methods. In some cases, it was possible to identify pre-expansion employment levels from newspaper reports — employment created by expansion was simply the difference between pre-expansion and 1973 employment levels. In other cases, 1973 employment was allocated according to the proportions of IDA grants received before and after expansion. The employment growth paths used for expansions were the same as for newly-established projects. In one case, the oil refinery at Whitegate, there was a significant drop in employment in the mid-1960s due to mechanisation. Therefore, the original “full-employment” level for this project was identified through newspaper and journal articles, and the 1973 IDA employment figure became the post-mechanisation level.

A sample of 81 foreign-owned firms that were established between 1973 and 1976 was used to test for the existence of a “typical” employment growth path from the commencement of production to “full”, or maximum employment.² The firms were categorised by industrial sector and by year of commencement. Autoregressive (maximum-likelihood) covariance models for pooled cross-section and time-series data were used to estimate the growth-paths of firms' employment levels (EMPLOYMENT) from start-up to “full employment”. The log of the time variable in years (LOGYEAR) was used to approximate linearity. The observations for each firm in the sample included the proportion of actual employment to the highest employment level for that firm for each of the first six years after it commenced production. The regressions revealed that

2. This sample includes all foreign firms that commenced production in Ireland during 1973–1976, survived for six years or more, and employed at least 20 persons during at least one year of their operation. A limited sample of post-1976 firms was available to the author, but these projects revealed a significantly different growth pattern due to the high numbers of closures and cutbacks incurred during the post-1980 recession. It was decided that the 1973–76 sample corresponded much more closely with pre-1973 employment patterns, because they were established and grew during a period of *reasonable* stability in *new* foreign investments in Ireland.

there were no significant differences among projects according to when they commenced production. Regressions of employment levels on the log of time of a firm's operation (in years) revealed a significant growth pattern among projects, characterised by a significant coefficient of LOGYEAR. Dummy variable analysis indicated that there were no significant differences in employment growth paths among sectors, with the exception of textiles.³

The regression analysis generated the following growth paths for new foreign manufacturing firms in Ireland (t-values are reported in parentheses):

$$\begin{array}{l} \text{EMPLOYMENT} = \quad .27093 \quad + \quad .37365 \text{ LOGYEAR} \quad R^2 = .7056 \quad (1) \\ \quad (\text{non-textile}) \quad \quad (14.668) \quad \quad (31.218) \quad \quad \quad \text{df} = 418 \end{array}$$

$$\begin{array}{l} \text{EMPLOYMENT} = \quad .42142 \quad + \quad .28870 \text{ LOGYEAR} \quad R^2 = .5743 \quad (2) \\ \quad (\text{textile}) \quad \quad (9.974) \quad \quad (9.337) \quad \quad \quad \text{df} = 64 \end{array}$$

These equations yield parabolic, approximately, seven-year employment growth paths, to "full-employment". As the t-values clearly indicate, the relationship for both non-textile and textile projects is significant beyond the .00001 level.

Estimates of employment in new foreign industry between 1955 and 1973 were made by calculating the employment created in each of the seven years of the growth paths of the 416 new foreign firms. Projects that commenced production in 1968 were entered as in the sixth year of their growth paths at the time of the 1973 IDA survey; 1969 in their fifth year, 1970 in their fourth, and so on. Sectoral and overall employment totals for each year were calculated by adding the new employment created by projects in their growth paths in that year to the employment totals of previous years. Thus, overall employment grows smoothly toward the 1973-survey levels. In any sector, employment in a given year must either rise or stay the same compared to the previous year, unless employment lost due to the failure of a firm (firms) is greater than new employment generated by firms in their growth paths. Employment *levels* are unlikely to fall from year to year, although the rate of growth of employment may either rise or fall. While this may have been untrue of some specific foreign projects, it is a realistic assumption at the sectoral level for a period (1955-73) that was devoid of major recessions.

3. Regressions were run for each industrial sector against all other industry (i.e., including the employment and LOGYEAR variables, as well as dummy variables for each industrial sector and for the sector*LOGYEAR interaction). The results have not been included here, due to space limitations. With the exception of textiles, the coefficients of the dummy variables for each industrial sector, and for the interaction between each sector and LOGYEAR, were all small and insignificant at least at the .05 level.

The employment growth-paths were also estimated using ordinary least squares. The differences among estimators was slight, and the autoregressive models were chosen as the best estimators, given the evidence of first-order autocorrelation.

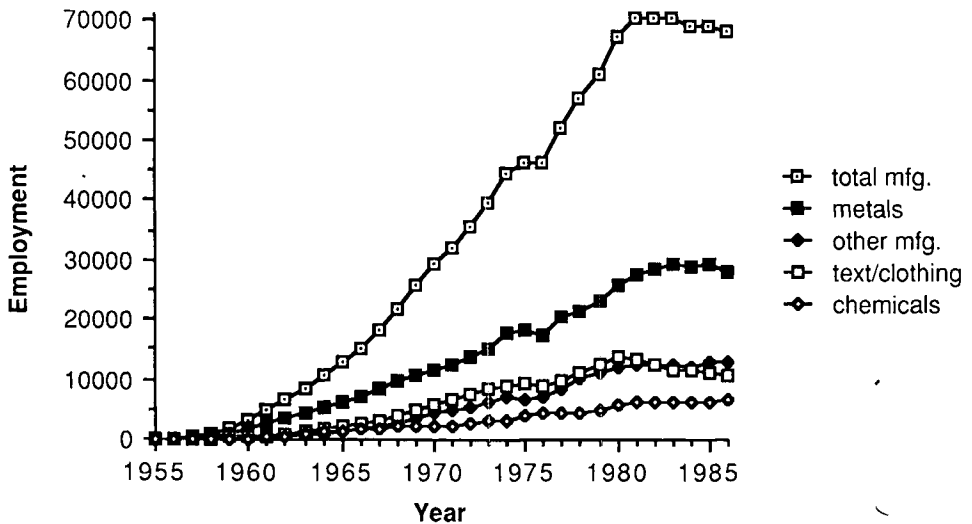
IV RESULTS

Estimates of employment in new export-oriented foreign industry from 1956 to 1972 are given in Table 2, along with IDA survey results for 1973–86. The 1973–86 figures differ slightly from published IDA figures because the definition of new industry herein led to the deletion of some projects considered by the IDA to be “new industry”, and the addition of some others.⁴

While the new foreign sector was quite small during the 1950s, it was beginning to grow rapidly by 1959. The level of growth (i.e., the number of new jobs created each year) continued to increase until 1970, when there was a slight two-year drop. It increased again between 1972 and 1974, until the oil-crisis recession caused contractions of foreign direct investment. From 1957, the largest increases of new foreign employment were consistently in the metals sector.

The growth-path of employment in new foreign industry is shown in Figure 1. The employment history for total manufacturing conforms to the characteristic “extinguishing curve” or “take-off” growth path. Between 1955 and 1972, there is a reasonably constant annual rise in the numbers of new employees in foreign

Figure 1. Employment in new foreign industry by sector, 1956-86.



4. The IDA data suffer from several shortcomings. First, once a project changes its status (e.g., from “Irish” to “foreign”) its employment totals are listed in the *new* category from 1973 — when the surveys began — *not* from the date when the change took place. In addition, the IDA sometimes characterises the same firm differently in different lists, seemingly for political reasons. Thus, a number of projects that are considered to be “new foreign industry” in the IDA’s lists of principal foreign-owned projects, are considered to be “Irish” projects in the employment surveys.

Table 2: *Employment in New Foreign Industry at Beginning of Year, 1956-72 (Estimates) and 1973-86 (IDA Survey Data)*

<i>Sector</i>	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Food			7	13	34	53	149	171	266	343	504	1,006	1,508	2,143	2,744	3,118	3,645
Drink				26	51	66	77	85	92	98	98	98	137	174	196	212	224
Textiles	13	19	23	26	28	189	373	485	877	1,081	1,283	1,528	2,101	2,501	2,974	3,455	4,179
Clothing	34	88	128	208	281	446	593	741	859	1,029	1,319	1,694	2,019	2,432	2,878	3,160	3,455
Wood products						53	104	138	179	212	236	317	382	422	460	500	532
Paper & print				144	344	489	586	658	715	764	779	815	884	938	972	1,010	1,059
Clay & cement								52	158	241	294	332	457	596	696	761	859
Chemicals		3	87	166	216	316	659	981	1,238	1,446	1,633	1,843	2,069	2,276	2,300	2,439	2,850
Metal products	6	112	374	946	1,705	2,615	3,548	4,273	5,198	6,241	7,236	8,460	9,629	10,741	11,784	12,619	13,754
Other mfg.	38	74	133	184	384	624	827	1,032	1,079	1,401	1,730	2,180	2,610	3,491	4,345	4,855	5,401
Total mfg.	91	296	752	1,713	3,043	4,851	6,916	8,616	10,661	12,856	15,112	18,273	21,796	25,714	29,349	32,129	35,932
<i>Sector</i>	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986			
Food	4,059	4,242	4,593	4,535	4,592	5,142	4,787	5,050	5,361	5,286	5,173	5,096	4,820	4,813			
Drink	234	283	511	616	678	725	818	935	1,019	1,082	1,020	1,041	1,021	1,054			
Textiles	4,601	5,135	5,951	5,652	6,765	7,753	8,436	9,466	9,151	8,002	7,184	6,824	6,074	5,784			
Clothing	3,806	3,942	3,427	3,333	3,217	3,376	3,997	4,301	4,443	4,297	4,549	4,786	4,932	5,073			
Wood products	598	720	734	548	665	621	695	766	764	695	683	819	825	854			
Paper & print	1,147	1,331	1,540	1,511	1,595	1,590	1,336	1,377	1,384	1,337	1,361	1,349	1,336	1,411			
Clay & cement	959	1,015	977	994	1,092	1,587	1,758	1,865	1,889	2,026	1,981	1,819	1,848	1,803			
Chemicals	3,073	3,210	3,841	4,370	4,265	4,651	5,099	5,600	6,327	6,322	6,203	6,137	6,303	6,581			
Metal products	15,268	17,915	18,239	17,517	20,716	21,612	23,107	26,094	27,882	28,765	29,619	29,119	29,361	28,115			
Other mfg.	6,093	6,993	6,726	7,241	8,564	10,081	11,259	12,031	12,353	12,561	12,662	12,276	12,910	12,985			
Total mfg.	39,838	44,786	46,539	46,317	52,149	57,138	61,292	67,485	70,573	70,373	70,435	69,266	69,430	68,473			

projects. Indeed, with the exception of the 1974/75 recessionary slump, the levels of growth continue upward into the 1970s. The most worrying aspect of the employment growth curve, however, is the rapid downturn of employment growth at the end of the 1970s. This downturn has continued to the present time, and looks more like a permanent trend than a cyclical recessionary feature as in the mid-1970s. Although the metals sector predominates throughout, the trend of employment in total manufacturing is reflected in each of the industrial sectors. Even the two sectors that did not suffer large employment losses in the 1980s (chemicals, other manufacturing) experienced significant falls in their employment growth levels.

The pre-1973 foreign-employment histories of the leading industrial sectors are shown in greater detail in Figure 2. The predominance of the metals sector is obvious from the very early years. More surprising, perhaps, is the failure of the food and drink sector to "take off" until after 1966. Likewise, new foreign employment in the chemicals sector did not begin to grow rapidly until the mid-1970s. On the other hand, the new foreign textiles and clothing sectors grew rapidly from an early date, a trend which makes these sectors' employment losses of the 1980s even more prominent.

Figure 2. Employment in new foreign industry by sector, 1956-72.

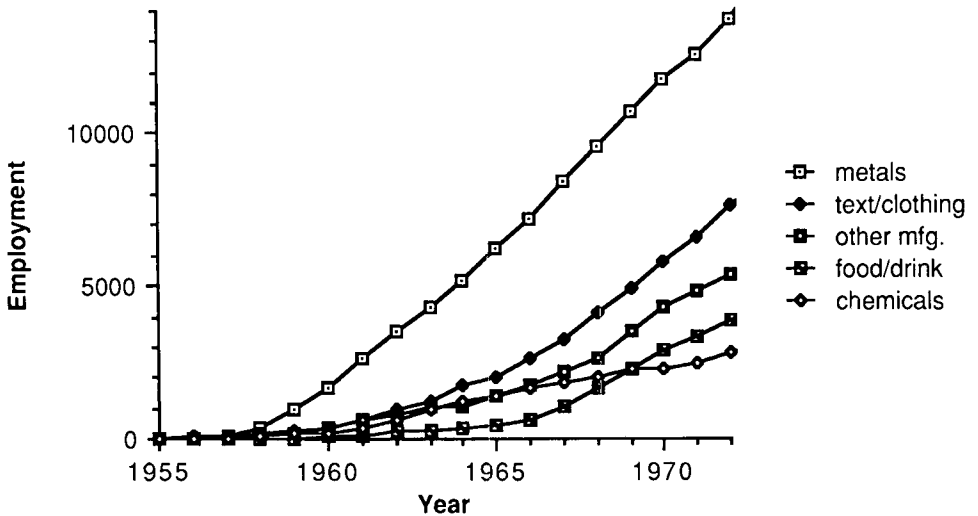


Table 3 shows the relation of new foreign employment to total manufacturing employment.⁵ It reveals a consistent and rapid rise in the new foreign share from

5. Total manufacturing employment for 1956-1972 is derived from the Census of Industrial Production results for December of each year. These totals are revised upwards to account for the firms that were excluded from the CIP. The adjustment factor for each sector was obtained by taking the average of the 1973 and 1974 ratios of IDA Employment Survey totals to CIP employment totals.

Table 3: *New Foreign Employment as a Percentage of Total Employment, 1956-86*

<i>Sector</i>	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Food			0.0	0.0	0.1	0.1	0.4	0.4	0.6	0.8	1.1	2.3	3.4	4.7	5.9	6.5	7.7
Drink				0.2	0.5	0.6	0.7	0.8	0.8	0.9	0.8	0.9	1.2	1.5	1.7	1.8	2.0
Textiles	0.1	0.1	0.1	0.1	0.1	0.9	1.7	2.3	3.9	4.7	5.6	6.6	8.8	10.1	11.2	13.0	16.7
Clothing	0.1	0.4	0.5	0.9	1.2	1.8	2.3	2.9	3.3	3.9	5.1	6.6	7.8	9.3	10.2	11.3	12.8
Wood products						0.6	1.2	1.4	1.8	2.1	2.3	3.2	3.9	4.2	4.5	4.9	5.3
Paper & print				1.2	2.8	3.8	4.5	4.9	5.4	5.8	6.1	6.3	6.5	6.7	6.8	6.8	7.0
Clay & cement								0.6	1.7	2.4	2.7	3.1	4.2	5.2	5.7	6.2	6.1
Chemicals		0.1	1.7	3.1	3.8	5.2	10.3	15.2	18.7	21.5	23.8	24.1	26.3	27.5	26.2	26.8	31.0
Metal products	0.0	0.5	1.8	4.5	7.7	10.8	13.3	14.8	17.1	19.3	22.1	25.3	28.9	30.6	31.0	32.3	35.2
Other mfg.	0.6	1.2	2.2	3.0	5.7	8.8	10.9	12.9	13.0	15.1	18.0	22.7	26.6	33.3	38.5	39.3	42.5
Total mfg.	0.1	0.2	0.5	1.0	1.8	2.8	3.8	4.5	5.5	6.4	7.5	9.0	10.6	12.0	13.1	14.0	15.8
<i>Sector</i>	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986			
Food	8.5	8.4	8.9	8.9	9.1	10.1	9.3	9.8	10.9	11.0	11.0	11.1	11.0	11.6			
Drink	2.1	2.5	4.4	5.3	6.1	6.8	7.4	8.3	9.0	9.6	9.4	10.2	10.6	11.3			
Textiles	20.0	22.1	26.3	28.7	33.7	37.3	40.2	43.2	46.0	44.2	45.1	46.5	45.5	44.9			
Clothing	16.0	16.3	15.3	16.2	16.3	17.0	19.8	21.3	24.1	23.6	26.0	29.6	32.0	34.5			
Wood products	5.8	6.6	6.9	5.3	6.2	5.8	6.1	6.5	6.5	5.7	5.7	7.1	7.3	7.7			
Paper & print	7.9	8.7	9.7	9.9	9.7	9.5	8.0	8.1	8.3	8.5	9.2	9.5	9.7	10.2			
Clay & cement	6.1	6.2	6.0	6.2	6.7	9.1	9.5	9.7	10.2	11.3	11.8	11.9	12.5	12.6			
Chemicals	28.7	28.9	32.4	36.7	37.3	40.2	43.1	43.7	48.4	50.7	50.7	50.6	52.6	54.5			
Metal products	34.7	37.4	38.1	38.2	41.3	43.3	41.8	42.6	45.2	46.3	48.6	50.5	53.1	52.6			
Other mfg.	42.7	46.2	44.5	46.6	50.7	55.2	57.9	59.8	61.5	62.2	62.1	64.6	67.4	67.4			
Total mfg.	18.5	19.8	20.6	21.3	23.4	25.2	25.9	27.3	29.4	29.8	30.8	32.0	33.3	33.9			

1.8 per cent in 1960 to 7.5 per cent in 1966 and 15.8 per cent in 1972. In terms of annual *increases* of employment, new foreign subsidiaries were predominant by the mid-1960s, when they accounted for more than half of the yearly increases in manufacturing employment. Already by the late 1950s, new foreign industry made up from a quarter to one half of yearly increases in manufacturing employment.

The accuracy of the estimates in Table 2 may be judged by comparing the 1960 and 1966 estimates to the results of employment surveys taken in those years. From these surveys, O'Malley⁶ has estimated the level of new foreign employment to have been 3,000-4,000 in 1960 and 9,000-10,000 in early 1966. From Table 2, the estimate of total new foreign employment during 1960 is between 3,043 (at the beginning of the year) and 4,851 (at the end). This concurs with O'Malley's estimates. The 1966 estimate in Table 2 of 15,112 is 5,000-6,000 higher than O'Malley's figure. However, the 1966 survey on which O'Malley's estimate is based includes neither firms in the Shannon free trade zone, nor new firms that did not receive "new industry" grants from the IDA. It also uses the IDA classifications of nationality, which incorrectly classified some foreign companies as Irish (e.g., the Whitegate oil refinery). Industrial employment at Shannon in 1966 already totalled more than 3,000, and was almost all foreign (SFADCo, 1966-67). Perhaps another 1,000 employees were in projects whose nationality was misclassified by the IDA. Thus, using O'Malley's accounting, total new foreign employment was probably close to 15,000 in early 1966. The evidence from the surveys, therefore, adds weight to the claim for accuracy of the employment estimates presented here.

Finally, it is possible to test the applicability of post-1973 employment-growth paths to pre-1973 projects, by testing the actual growth performances of firms that were still in their growth period (i.e., less than seven years old) in 1973. In these cases (projects established between 1968 and 1972), we have actual survey data for two to six years of each firm's employment growth period. We can test for significant differences between these projects' actual employment growth, and the employment growth model, by means of a dummy variable regression model (similar to the model in Equation (2)) which dichotomizes post-1973 projects vs. pre-1973 projects (AGE). The resulting equation is:

$$\begin{aligned} \text{EMPLOYMENT} = & .265237 + .379059 \text{ LOGYEAR} + .161180 \text{ Textiles} & (3) \\ & (28.290) & (3.540) \\ & + .074016 \text{ Age} - .095226 \text{ Textiles*LOGYEAR} - .045997 \text{ Age*LOGYEAR} \\ & (1.312) & (-2.619) & (-1.180) \end{aligned}$$

6. Eoin O'Malley, 1983, p. 152 and appendix 4. O'Malley's estimates are based on unpublished data from the 1967 survey of grant-aided industry.

$$- .249959 \text{ Age*Textiles} + .142266 \text{ Age*Textiles*LOGYEAR}$$

$$(-1.245) \qquad (1.076)$$

$$R^2 = .60796 \quad df = 681$$

As the regression clearly shows, there is no significant difference between post-1973 firms and pre-1973 firms; the coefficients of interaction between a firm's startup date and its employment growth (Age*LOGYEAR, Age*Textiles*LOGYEAR) are small and insignificant. This adds considerable support to the claim that the growth model based on firms established in 1973-76 applies well to earlier dates.

V DISCUSSION

The estimates of foreign employment in Table 2 help to clarify the nature of the evolution of foreign investment in Ireland. For example, there is a popular conception that early foreign projects were concentrated in "traditional" sectors such as food and textiles. Yet the "metals" sector, which is generally considered the most "modern", predominated from the very early years of export-led industrialisation. In fact, this sector was most predominant in terms of its share of new foreign employment by 1959-1962, when it accounted for nearly half. After 1962, its share fell, so that today it accounts for "merely" 41.1 per cent of new foreign employment in manufacturing.

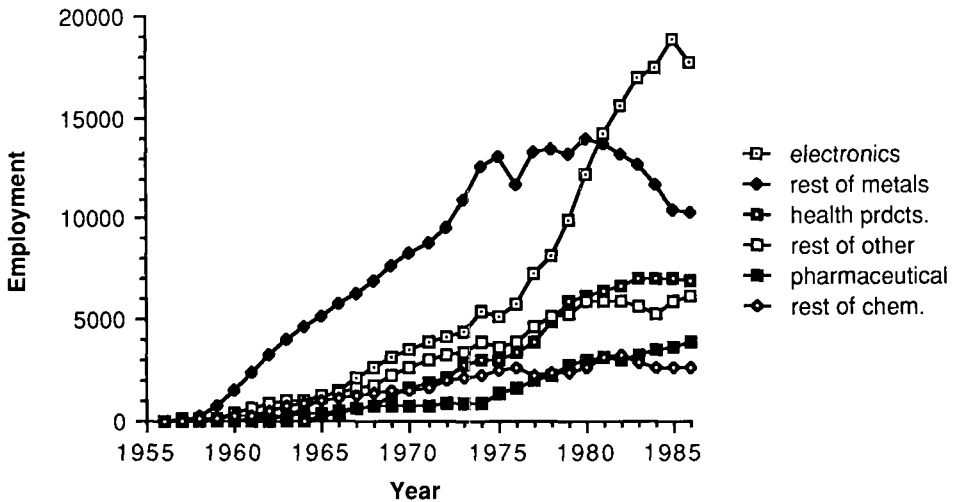
The crude sectoral classification "metal industry", however, hides the fact that early foreign investment projects were in the more "traditional" metals projects — e.g., aluminium extrusions, shipbuilding, cranes, metal nuts. Only in the mid-1960s did the first significant electronics projects appear, and these did not predominate in the metals sector until the 1970s. Thus, early projects in the metals sectors were generally no more "modern" in their technology than the early large-scale projects in wood, paper and plastics. Most of these early metals projects were non-American.

Similar distinctions may be made in other sectors. In the "other manufacturing" sector — mainly plastics, rubber, and health products — the early foreign projects were for the production of "traditional" consumer products, such as ball-point pens and plastic tape, or basic industrial products, such as plastic tubes and pipes. Only in 1964 did the first project producing health products appear, and this group of products became predominant in the "other" sector only in the 1970s (as pharmaceuticals came to dominate in the "chemicals" industry). These changes — which reflected the changing nature of the transnational division of labour, as well as new advantages to "high technology" US corporations when Ireland joined the EEC — underscore the limitations of the

broad industrial classifications that have generally been employed in the literature on foreign investment.

The shifts of the distribution of direct foreign investment within the metals, chemicals and other manufacturing sectors may be seen in Table 4. Here, the estimates of foreign employment in the pharmaceuticals, electronics and health-products subsectors for 1956-1972 are derived in the same manner as in Table 2. Clearly, each of these three "modern" industrial subsectors were relative late-comers to Ireland. While the three subsectors eventually came to predominate foreign investment in their respective sectors, they began to grow rapidly only in the early to mid-1970s, when new employment in the remainder of their sectors began to stagnate. Already by the 1980s, even these three "dynamic" foreign subsectors were beginning to stagnate (see Figure 3).

Figure 3. Employment in metals, chemicals, other mfg. and subsectors, 1956-86.



The estimates of new foreign employment contained herein should be useful for the statistical study of a series of social and economic variables that are affected by the entry of export-oriented transnational capital since the late 1950s. Like any derived time series, the pre-1973 estimates should not be used without caution in econometric analyses. Analysts may, for example, want to include some form of error analysis in any econometric models that incorporate them. The main source of error, if it exists to any extent, is likely to originate from the assumption that companies' employment levels *on average* remained stable between the end of their "growth path" and 1973. But even this source of error may be less severe than the errors which arise from varying definitions of

Table 4: *Employment in New Foreign Projects in Pharmaceuticals, Electronics and Healthcare Products Subsectors, and Their Proportion of New Foreign Employment in the Chemicals, Metal and Other-Manufacturing Sectors, 1957-86*

<i>Sector</i>	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
(1) Pharmaceuticals					63	184	277	336	426	511	616	698	746	780	811	845
(2) Rest of chemicals	3	87	166	216	253	475	704	902	1,020	1,122	1,227	1,371	1,530	1,520	1,628	2,005
(1) as % of (2)					19.7	27.9	28.2	27.1	29.5	31.3	33.4	33.7	32.8	33.9	33.3	29.6
(3) Electronics	66	129	169	195	226	253	273	600	1,094	1,462	2,110	2,703	3,122	3,496	3,858	4,151
(4) Rest of metals	56	245	777	1,510	2,389	3,295	4,000	4,598	5,147	5,774	6,350	6,926	7,619	8,288	8,761	9,597
(3) as % of (4)	58.9	34.5	17.9	11.4	8.6	7.1	6.4	11.5	17.5	20.2	24.9	28.1	29.1	29.7	30.6	30.2
(5) Healthcare prdts							15	30	192	346	591	802	1,247	1,642	1,865	2,113
(6) Rest of other mft	74	133	184	384	624	827	1,017	1,049	1,209	1,384	1,589	1,808	2,244	2,703	2,990	3,288
(5) as % of (6)							1.5	2.8	13.7	20.0	27.1	30.7	35.7	37.8	38.4	39.1
<i>Sector</i>	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986		
(1) Pharmaceuticals	933	928	1,344	1,676	1,974	2,301	2,717	2,985	3,167	3,039	3,319	3,543	3,666	3,895		
(2) Rest of chemicals	2,140	2,282	2,497	2,694	2,291	2,350	2,382	2,615	3,160	3,283	2,884	2,594	2,637	2,686		
(1) as % of (2)	30.4	28.9	35.0	38.4	46.3	49.5	53.3	53.3	50.1	48.1	53.5	57.7	58.2	59.2		
(3) Electronics	4,361	5,375	5,171	5,805	7,326	8,188	9,893	12,152	14,196	15,594	16,964	17,469	18,917	17,767		
(4) Rest of metals	10,907	12,540	13,068	11,712	13,390	13,424	13,214	13,942	13,686	13,171	12,655	11,650	10,444	10,348		
(3) as % of (4)	28.6	30.0	28.4	33.1	35.4	37.9	42.8	46.6	50.9	54.2	57.3	60.0	64.4	63.2		
(5) Healthcare prdts	2,729	3,044	3,017	3,382	3,945	4,891	5,929	6,150	6,422	6,700	7,047	7,052	7,029	6,870		
(6) Rest of other mfg	3,364	3,949	3,709	3,859	4,619	5,190	5,330	5,881	5,931	5,861	5,615	5,224	5,881	6,115		
(5) as % of (6)	44.8	43.5	44.9	46.7	46.1	48.5	52.7	51.1	52.0	53.3	55.7	57.4	54.4	52.9		

firms as “Irish” or “foreign”, and their classification by economic sector. Unfortunately, classifications of firms can differ significantly between, for example, the IDA and the CSO — or even among IDA surveys — and there may be a tendency among econometricians and other social scientists to ignore these differences. Because of the relatively unambiguous nature of employment levels as a measure of the size of industrial projects, however, the employment estimates are probably considerably better than many other derived time series that have been utilised in econometric studies (e.g., time series of fixed capital stock in Irish industry; see Vaughan, 1980).

The sectoral employment estimates presented in Tables 2 and 4, as well as the overall estimates of new foreign employment in manufacturing, provide an insight into the evolution of the export-led development regime in Ireland since 1955. They may also provide a basis for longitudinal studies of the effects of foreign industrial investment on many characteristics of Irish economic and social development after 1955.

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