Segmented Labour Markets and Earnings in Ireland*

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Abstract: Segmented labour market theory rests on two central tenets. The first is that it is meaningful to distinguish between primary labour markets providing "good" jobs with high wages and stable employment and secondary labour markets providing "bad" jobs with low pay and unstable employment. The second is that jobs in primary labour markets are rationed, with substantial barriers to entry from secondary labour markets. The rationing hypothesis cannot be tested for Ireland with the data available, but here we test the hypothesis that wage determination differs across sectors, using data from a 1987 ESRI household survey. Two formulations of the segmented labour market model are tested, one distinguishing only primary and secondary sectors and the other distinguishing four sectors employed in recent US research by Gordon. Estimating standard earnings functions for both variants suggests that returns to education are lower in secondary markets, as predicted by segmentation theory, but contrary to the theory's predictions returns to work experience do not differ across sectors. There may be a less clear-cut divide between sectors in European countries than in the USA, partly because of the role of trade unions. The policy implications of adopting a segmented labour market perspective are markedly different from those of human capital theory on some central issues of labour market policy, so further investigation of that perspective appears warranted.

I INTRODUCTION

H uman capital theory emphasises differences among individuals as the determinants of the distribution of earnings: workers in low-wage jobs are those who have low productivity, because they have been unable or

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unwilling to obtain the skills necessary to improve their productivity and earnings. As Hicks (1963, p. 82) put it starkly, unskilled labour is "often badly paid, not because it gets less than it is worth, but because it is worth so appallingly little". Segmented labour market theory, on the other hand, sees the labour market as divided into distinct sectors, providing jobs which can be ranked along a spectrum ranging from "good" to "bad". Good jobs are rationed and each sector has a different wage determination system. Hence, the job rewards achieved by comparable individuals are systematically differentiated according to job characteristics. The ideas behind segmentation theory have a long history, and they inspired a substantial body of research in the 1970s, particularly in the USA (following Doeringer and Piore (1971)).[1] After a brief eclipse following Cain's (1976) critique there has been a resurgence of interest in segmentation in the USA in the last decade, the work of Dickens and Lang (1985, 1993) being particularly influential. Indeed, some see segmentation theory as having recently been integrated into the mainstream of labour market theory (Blackaby, Clark and Leslie, 1995), though in our view this assessment is premature.

There has been little attempt to test or apply segmented labour market ideas in empirical work on the Irish labour market (although Hughes and Nolan (1996) used a primary/secondary sector distinction in analysing occupational pension entitlements). This reflects not only the scarcity of suitable information on pay, conditions and workforce and job characteristics, but also the fact that the underdeveloped state of segmented labour market theory itself makes testing or application difficult. The purpose of this paper is to implement with Irish data empirical tests of a core element of the segmented labour market model, the divergence between sectors in the way earnings are determined. This provides a point of comparison between Ireland and corresponding results for the USA and the UK, and brings out difficulties inherent in testing dual or segmented labour market theory which proponents will have to overcome if they are indeed to be integrated into mainstream labour market theory.

We use data on a large sample of employees obtained in the major household survey carried out by the ESRI in 1987, described in Section II, which also sketches out the basic elements of the segmentation hypothesis and how it has been tested elsewhere. In Section III we first test the dual version of the model in which the labour market is divided into only primary

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1. The roots of the segmented labour market model can be traced back to the work of Mill (1885) and Cairnes (1874) on "non-competing groups". Its modern development by Doeringer and Piore (1971), Gordon, Edwards and Reich (1982) and others owes much to the work of the American Institutionalists, Kerr (1954) and Dunlop (1957), on the balkanisation of labour markets.

and secondary sectors, allocating individuals to these sectors on the basis of the broad industry group in which they work. Section IV tests a more complex US version of the segmented model, developed by Gordon (1986) and refined by Waitzman and Smith (1994), in which the labour market is divided into four groups: independent primary professional and technical; independent primary craft; subordinate primary; and secondary sectors. Conclusions are in Section V.

II TESTING SEGMENTED LABOUR MARKET THEORY

In the standard human capital competitive model of the labour market, earnings are a positive function of an individual's education and experience. Segmented labour market theory, by contrast, focuses on the characteristics of jobs rather than individuals in determining the distribution of earnings. In the simple dual variant there is a primary market which pays high wages and provides significant rates of return to investment in education and employment experience, and a secondary market which pays lower wages and provides lower or zero returns to education or experience. In Doeringer and Piore's (1971) formulation:

> ... Jobs in the primary market possess several of the following characteristics: high wages, good working conditions, employment stability, chances of advancement, equity, and due process in the administration of work rules. Jobs in the secondary market, in contrast, tend to have low wages and fringe benefits, poor working conditions, high labor turnover, little chance of advancement, and often arbitrary and capricious supervision. (pp. 165-6).

The fact that primary sector jobs are rationed is central to the theory: the high pay of primary sector employees cannot be explained simply in terms of their higher quality, many secondary sector employees are capable of performing well in primary jobs but the rationing of access to good jobs denies them the opportunity to do so (McNabb and Ryan, 1990). Theories advanced in the 1970s to explain why the higher earnings of primary sector workers are not competed away included Thurow's (1975) "job competition theory", and Doeringer and Piore's (1971) moderate and Edwards, Reich and Gordon's (1975) radical dual versions of segmented labour market theory. More recently, advocates of a segmented labour market perspective have appealed to efficiency wage theory or insider-outsider models (Dickens and Lang, 1993). Rather than a coherent, self-contained theory to be seen as an alternative to human capital theory, the segmented labour market perspective calls on a variety of possible theoretical underpinnings, and this

agnosticism runs through much of the empirical literature.

The most common test of dual labour market theory involves the estimation of separate earnings functions for the two sectors. If the segmented labour market model explains earnings data better than the competitive model, then two wage equations or earnings functions should give a better fit to the earnings distribution than one. In the primary market there is expected to be a strong positive relationship between earnings and education and earnings and work experience. In the secondary market these relationships are expected to be weaker, or earnings should show little association with increases in years of education or work experience. This type of test has been employed in a number of studies, including Osterman (1975); Wright (1979); and Carnoy and Rumberger (1980) for the USA, and by Mayhew and Rosewall (1979); and McNabb (1987) for Britain.

The crucial issue in implementing such a test is how to allocate individuals to primary versus secondary sector. Interest in dual labour market theory waned in the late 1970s principally because of Cain's (1976) demonstration that the way workers are classified as primary or secondary may itself bias the results in favour of the dual labour market hypothesis. If low wage is used as the basis for allocation to the secondary sector, for example, then even if there is in fact a single market, estimated earnings equations for the two sectors will show lower returns to education in the secondary sector. In effect, the allocation procedure can result in the truncation of the secondary sector sample on the values of the dependent variable, biasing the results in favour of the dual hypothesis. Strategies adopted to deal with this problem include allocation on the basis of the observed wage with correction for sample selection bias (Heckman and Hotz, 1986; Heckman, 1979), using a switching regression model (Dickens and Lang, 1985), and allocation on the basis of job characteristics (Gordon, 1986). The procedures employed by Heckman and Hotz and by Dickens and Lang are each open to technical objections (brought out in their comments on each other's work) but the more fundamental problem is the theoretical agnosticism to which we referred earlier: neither advances a theoretical explanation for segmentation, applies an allocation procedure consistent with that theory, and then tests the hypothesis on that basis. None of the range of theoretical underpinnings for a segmentation hypothesis would allocate workers to sectors on the basis of the wage or individual characteristics; the core notion is that it is job rather than individual characteristics which matter. We therefore follow the third route, seeking to allocate on the basis of job characteristics, because this is the one which has the potential to link hypothesis testing to an underlying theoretical perspective.

The second key tenet of segmentation theory is that jobs in primary labour

markets are rationed, with substantial barriers to entry from secondary labour markets. If one can move out of the secondary sector to obtain returns on experience or education, then, as Cain (1976) pointed out, it does not much matter that there are no such returns in that sector. However, the existence of rationing is intrinsically very difficult to assess, and so far very few attempts to do so directly have been made (Dickens and Lang, 1985 being a notable exception). Longitudinal data on income and job mobility is clearly required and is becoming increasingly available, but it is difficult to relate the emerging evidence on occupational or income mobility directly to the rationing hypothesis, because it is not clear how much mobility one would expect with compared to without rationing.

Our aim here is to apply to Irish data tests of the first element of the segmentation hypothesis employed in the literature involving an a priori allocation into sectors which can be linked, whether loosely or more firmly, to an underlying theoretical perspective. In Section III we apply a primary/ secondary allocation in terms of industry, while in Section IV a more complex procedure distinguishing four sectors is applied. The data are from the ESRI survey of income distribution, poverty and usage of State services carried out in 1987, providing information on the education and labour market experience of a national sample of the population resident in private households. (A full description of the survey is available in Callan, Nolan et al., 1989.) Responses were obtained from a total of 3,294 households, an effective response rate of 64 per cent. The responding households were reweighted for analysis to correct for non-response bias, to ensure that the sample for analysis accords with the (much larger) Labour Force Survey in terms of four key characteristics: the number of adults in the household, urban/rural location, socio-economic group, and age of household head. Since the incomes of self-employed respondents include returns to capital as well as labour they are excluded from the analysis.

Our attention is focused on the 2,002 employees in sample households on whom full information was obtained on earnings, education, labour market experience and other characteristics to be employed in the analysis. Earnings functions estimated with this dataset have been presented in Callan (1991) for married men and married women; Nolan (1993) for the entire sample; and Callan and Wren (1994) for men and women and for married versus single men and women. This has been important in measuring, inter alia, the relationship between age, education and earnings and differences between men and women in the returns to education and experience. Here our interest in extending this work is to assess the extent to which sector of employment has a role in influencing these returns.

III TESTING AN INDUSTRY-BASED DUAL LABOUR MARKET
CATEGORISATION

Our first set of tests focus on a distinction simply between primary and
secondary labour market sectors. We wish to allocate workers between these
sectors in a way which minimises bias introduced by circularity via the
definition of sectors in terms of earnings itself or variables highly correlated
with earnings. In the standard human capital model, as Fleisher (1970)
points out:

> Industries are defined according to what is produced and, hence, econ-
> omic theory implies that in equilibrium there should be no differences
> among wage rates for the same kind of labor according to industry *per se*
> except for working conditions that vary systematically among
> industries. On the other hand, classifying workers by occupation and/or
> skill is to classify them by characteristics which, according to economic
> theory, should be among the most important determinants of wage rates
> (p. 206).

We, therefore, employ in this section an allocation of individuals to
primary or secondary sector on the basis of their industry of employment.
Hughes and Nolan (1996) classified major groups of Irish industries as ones
in which the majority of employees were likely to be working in the primary
or secondary market, based principally on McNabb and Ryan's (1990)
allocation for the United Kingdom. That depended on an analysis of sector
characteristics, with concentration, plant size, and capital intensity used as
the main features distinguishing "core" from "periphery" sectors, and
although the theoretical underpinnings need to be fleshed out, the distinc-
tions can at least be traced back to a theoretical emphasis on features of
product markets likely to give rise to dualistic labour markets. The resulting
allocation of major industrial groups to primary and secondary markets in
Ireland is shown in Table 1. Applying this classification to the 1987 sample
resulted in 73 per cent of employees being allocated to the primary market
and 27 per cent to the secondary market.

Descriptive accounts highlight the fact that primary and secondary sectors
differ in gender composition of the work force, the extent of part-time
working, unionisation, employment stability, and ancillary benefits. Table 2
shows that with the industry-based allocation procedure, the secondary sector
does have a higher proportion of women and of part-time workers than the
primary sector, and a much lower proportion belonging to a trade union, on
an incremental pay scale, or having entitlement to a retirement pension from
their employer. From information obtained in the survey about the number of

Table 1: *Allocation of Major Industrial Groups to Primary and Secondary Markets*

Primary Market	Secondary Market
Other Production	Agriculture
Insurance	Building and Construction
Professional Services	Wholesale
Teaching	Retail
Health	Personal Service
Public Administration	Other Industries

Source: Hughes and Nolan (1996).

years the respondent spent in employment and the number of different employers they have had in their career, one can also derive the average length of each job. Table 2 shows considerably greater stability in the primary sector, with each job lasting an average of 8.5 years compared with 5 years in the secondary sector. Labour Force Survey data also show particularly high unemployment rates in some of the industry groupings we have categorised as secondary rather than primary, notably building and construction.[2] All these characteristics are consistent with the notion that the primary sector offers more stable, less precarious employment with better conditions, is more highly unionised, and has a higher percentage of "core" full-time male workers.

Table 2: *Percentage Female, Unionised, Part-time, on Incremental Scales, with Pension Entitlement and Average Length of Job in the Primary and Secondary Markets*

Sector	Per Cent Female	Per Cent Union Member	Per Cent Part-time (18 hours)	Per Cent with Pension Entitlement	Per Cent Incremental Scale	Average Length of Job
Primary Labour Market	35.2	62.1	2.6	58.9	42.8	8.5
Secondary Labour Market	40.9	19.3	7.9	18.5	18.5	5.3

2.   Clarke and Kavanagh (1995) apply our industry-based primary/secondary categorisation to 1992 Labour Force Survey data and present results on the male/female breakdown, extent of part-time working and unemployment rates (their Table 5). However, their analysis covers all those at work, with 56 per cent in the primary and 44 per cent in the secondary market, largely because they include all farmers in the secondary sector, whereas we include only farm employees.

We now present the results of a series of regression models which test whether the industry-based dual labour market distinction helps in under-standing the determination of earnings in Ireland. This involves estimating standard log earnings functions, for the entire sample and for each sector separately. If the segmentation hypothesis is valid, the coefficients of education and work experience variables should be lower in the secondary than in the primary sector. Table 3 presents regression results for a simple model in which log gross hourly earnings is regressed on marital status, years of education and years of employment. The regression coefficients for the whole sample have the expected positive signs and all are significant at the 95 per cent level. Gross hourly earnings increase with years of education and years of employment, and married respondents have higher earnings *ceteris paribus* than unmarried respondents, as is commonly found.

Table 3: *Regression of Log Earnings of Employees on Marital Status, Years of Education, and Years of Employment for Whole Sample and for the Primary and Secondary Markets*

Variable	Whole Sample	Primary Market	Secondary Market
Constant	0.5835	0.7541	0.4691
	(0.026)	(0.029)	(0.055)
Married	0.2694	0.2264	0.2859
	(0.024)	(0.025)	(0.050)
Years of Education	0.1036	0.0992	0.0720
	(0.004)	(0.004)	(0.010)
Years of Employment	0.0178	0.0151	0.0178
	(0.001)	(0.001)	(0.002)
Adjusted R^2	0.3922	0.3878	0.2816
F	431.4973	309.5446	71.4200
Number of Observations	2,002	1,462	540
Mean Log Hourly Earnings	1.4411	1.5756	1.0763

In the separate regressions for the primary and secondary markets, the coefficients of the marital status, education, and employment experience variables again have positive signs and are significant in both regressions. The coefficient on the education variable in the secondary sector is however smaller than in the primary sector, as predicted by the dual labour market model. Also consistent with the model, the goodness of fit of the primary sector regression is better than the secondary sector regression, accounting for about 40 per cent of the variance in gross earnings compared with less

than 30 per cent. Contrary to the prediction of the segmented model, though, employment experience has a similar effect on gross hourly earnings in the two sectors. An F-test rejects the null hypothesis that there is no significant difference between the coefficients of the primary and secondary sector regressions.[3]

Only a minority of married women of working age are in the work force, and particularly in that case labour force participation is endogenous in that it may be influenced by the wage the individual can command. Thus studies of married women's labour force participation (including Callan and Farrell (1992) with this dataset), in modelling participation and earnings, seek to correct for possible selection bias in estimating earnings functions for that group. When the earnings functions for the primary and secondary sectors are estimated for men only, the results are as shown in Table 4. The general pattern of the estimated coefficients is similar to Table 3, but the gap between the education coefficients in the two sectors is narrower, and goodness of fit of the equation is now nearly as high in the secondary as in the primary sector.

Table 4: *Regression of Earnings on Marital Status, Years of Education, and Years of Employment for Whole Sample and for the Primary and Secondary Markets, Males Only*

Variable	Whole Sample	Primary Market	Secondary Market
Constant	0.7080	0.8442	0.5836
	(0.031)	(0.036)	(0.064)
Married	0.3451	0.2967	0.3690
	(0.030)	(0.034)	(0.0626)
Years of Education	0.0957	0.0927	0.0783
	(0.005)	(0.005)	(0.012)
Years of Employment	0.0128	0.0112	0.0132
	(0.001)	(0.001)	(0.003)
Adjusted R^2	0.4162	0.3872	0.3708
F	292.4041	194.769	60.9238
Number of Observations	1,227	921	306
Mean Log Hourly Earnings	1.5488	1.6510	1.2407

3. One could estimate a single equation for the entire sample with slope and intercept dummies for membership of the secondary sector, but to faciltate comparability we follow the segmentation literature in estimating separate sector regressions.

Since Dickens and Lang's (1985) influential test of the dual labour market hypothesis for the USA was confined to male household heads, we also estimated these earnings functions for the 819 male household heads in our sample (of whom 80 per cent were in the primary sector). The F-test again rejects the hypothesis that the coefficients of the primary and secondary sector regressions describe a common relationship determining average gross hourly earnings, but there is in this case little difference between the two sectors in the education and employment experience variables; the largest difference is in fact now for marital status. These results are in striking con-trast to Dickens and Lang's, who found education and employment experience to be significant for the primary but insignificant for the secondary sector in the USA (though sector of attachment was in their case determined within the model).

The results based on distinguishing between primary and secondary sectors *on an industry basis* suggest there may be some limited value to making that distinction in the Irish case, though the results are a great deal less clear-cut than tests of the dual market hypothesis from the USA. However, categorising employees into two sectors simply on the basis of industry provides at best a crude representation of the dual market hypothesis, since that hypothesis refers to the characteristics of jobs rather than industries. Segmented labour market theories would see every industry having both "good" and "bad" jobs, with the balance between the two varying across industries, so distinguishing sectors on an industry basis alone will necessarily misclassify some, perhaps a substantial number, of employees by sector. A simple dichotomy between primary and secondary sectors may itself be an over-restrictive formulation of labour market segmentation theory (as argued for example by McNabb and Ryan (1990)). In the next section we, therefore, adopt a more refined approach to categorising employees by sector, based on applying the schema developed for the USA by Gordon (1986) to an Irish setting.

IV THE FOUR SECTOR LABOUR MARKET MODEL

Gordon's Four Sector Model

The allocation of employees to core and peripheral segments in the models tested up to this point has been done at the one digit major industrial group level. A finer distinction between industries, and between occupations within them, in allocating jobs between labour market segments is desirable. The development of such a classification is a major undertaking as it requires detailed analysis and scoring of particular job characteristics. Detailed infor-mation on the characteristics of jobs included in each three digit occupation

group is not readily available for Ireland. However, such data are available for the United States from the *Dictionary of Occupational Titles* and these have been used by Gordon (1986) to allocate US 1980 census occupations to different labour market segments. Crucially from the point of view of testing the relevance of segmented labour market theory, the aim is to allocate on the basis of job rather than individual characteristics, which should minimise the bias introduced into estimates of the earnings/education or earnings/ experience relationship.

Gordon's classification, updated by Waitzman and Smith (1994), divides persons at work into four segments — independent primary professional and technical; independent primary craft; subordinate primary; and secondary. The classification of occupations into labour market segments is based on a detailed analysis of the characteristics of jobs in the US *Dictionary of Occupational Titles*. Three general imperatives were observed:

1. As much as possible the segment categories should refer to data about the characteristics of jobs, excluding information about the characteristics of the workers who hold those jobs.
2. As much as possible, similarly, the segment categories should build upon data which excludes information about final labour market outcomes, such as wages and turnover rates.
3. Given the importance of industrial characteristics in defining differences between "core" and "peripheral" firms and given the strong likelihood of job segmentation within core firms, it is important to take both industry *and* occupational characteristics into account. (Gordon, 1986).

Industry and occupation data are used since data on firms are not available. Gordon, Edwards, and Reich (1982) concluded that the distinction between goods-producing sectors and non-goods sectors is crucial because of the mediating influence of trade unions in goods-producing sectors in standardising job conditions across occupations. This means that for semi-skilled and unskilled "blue-collar" workers in goods-producing sectors, the industry in which the person works determines allocation to the subordinate primary or secondary sector. In all other cases the person's occupation determines segment allocation. The results of a factor analysis of three-digit industries by Oster (1979) are used to divide all three-digit industries in the goods-producing sectors into "core" and "peripheral" industries. Gordon's approach is thus rooted in a theoretical perspective on the way particular features of the product market produce segmentation in the labour market, and is particularly thorough in devising a detailed schema to allocate jobs into these segments.

Applying the Four Sector Model to Ireland

The occupation and industry data in the US Census 1980 and the Irish Census of Population 1981 are both based on ISCO 68 — the International Standard Classification of Occupations (ISCO 68) — and the second revision of ISIC — the International Standard Industrial Classification of All Economic Activities issued by the UN in 1968. Assuming that the characteristics of jobs with similar job titles in Ireland and the United States are similar, Gordon's classification scheme for the USA can be used as a guide in classifying the Irish data. The allocation of respondents in the 1987 ESRI survey to different labour market segments was done as follows:

(a) Each of the 199 occupation titles in the Irish Census of Population 1981 were compared with the 499 occupation titles in the US Census of Population 1980. A match was made between each occupation in Ireland and an occupation in the United States. The occupation in Ireland was then allocated to the same labour market segment as the segment to which the matching occupation in the US was allocated by Waitzman and Smith (1994). This resulted in an allocation of the employed labour force in Ireland to the four labour market segments independent primary professional/technical; independent primary craft; subordinate primary; and secondary.

(b) Semi-skilled and unskilled occupations in goods-producing sectors in Ireland were identified on the basis of the match with corresponding jobs in the US.

(c) Each of the 37 core and 57 peripheral industries in the goods producing sectors in the US were compared with the 199 Census industries for Ireland. A match was made between the 37 core industries in the US and 37 core industries in Ireland and between 57 peripheral industries in the US and 63 peripheral industries in Ireland.

(d) Semi-skilled and unskilled occupations in core and peripheral industries in Ireland were then allocated to the subordinate primary sector and secondary sectors respectively.

(e) To take into account the very different nature of public service employment in Ireland — with much higher levels of unionisation and job security than in the USA — jobs in the public sector which would in the US categorisation be in the secondary sector were reallocated to the subordinate primary sector.

The distribution of employees by sector in Ireland in 1987 given by Gordon's four-sector labour market classification (as amended) is shown in Table 5, together with a comparison of the distribution of employment in the United States in the same year. The two distributions are very similar, with

about 25 per cent in the secondary sector in each case. This is also very close to the size of the secondary sector produced by the two sector classification used in Section IV, but the actual allocation of jobs differs significantly between the two. Only about 60 per cent of those in the secondary sector using the four-way categorisation were allocated to that sector by the industry-based classification in Section IV.

Table 5: *Distribution of Employment in Four Labour Market Segments in Ireland and the United States in 1987*

Labour Market Segment	Ireland (%)	United States (%)
Independent Primary Professional and Technical	25.4	29.3
Independent Primary Craft	13.9	10.8
Subordinate Primary	35.0	33.9
Secondary	25.7	26.0

Table 6 compares the characteristics of the four sectors in terms of the percentage of employees who are female, part-time, union members, on incremental scales, with pension entitlement, and the average length of job. This shows that the secondary sector has the highest proportion female and a much higher percentage part-time than the other sectors, the lowest proportion union members, on incremental scales and with pension entielement,

Table 6: *Percentage Female, Unionised, Part-time, with Pension Entitlement and Average Length of Job in Four Labour Market Segments in Ireland 1987*

	Per Cent Female	Per Cent Union Members	Per Cent Part-time (18 hours)	Per Cent with Pension Entitlement	Per Cent on Incremental Scale	Average Length of Job (Years)
Independent Primary Professional and Technical	37.3	54.0	2.2	70.5	52.7	9.95
Independent Primary Craft	10.4	51.4	0.0	45.0	31.3	7.43
Subordinate Primary	38.9	61.4	2.0	55.8	38.3	7.05
Secondary	55.1	29.1	8.3	16.9	19.8	6.16

and the shortest average length of job; all consistent with descriptive accounts of the way the secondary sector differs from the rest of the labour market.

Regression Results for the Four Sector Simple Model

We now employ this four-way categorisation and assess the extent to which earnings functions differ across the sectors. The regression results with the simple model containing as explanatory variables only years of education, experience, and marital status are presented in Table 7. The model explains nearly 40 per cent of the variance in average log hourly earnings for the whole sample, about one-third for the independent primary professional and technical and the independent primary craft sectors, but only 23 per cent for the subordinate primary sector and 17 per cent for the secondary sector. Years of education has a significant positive effect on earnings in the three primary sectors but is now insignificant in the secondary sector. Years of employment have a similar positive effect on earnings in all four sectors, on the other hand, contrary to the segmented labour market model's prediction. The hypothesis that the coefficients in the regressions for the four labour market segments come from the same model as the coefficients for the whole sample is rejected by the F-test for stability of coefficients.

Table 7: *Regression of Earnings of Employees on Marital Status, Years of Education, and Years of Employment for the Whole Sample and for Four Labour Market Segments*

Variable	Whole Sample	Independent Primary Professional and Technical	Independent Primary Craft	Subordinate Primary	Secondary Market
Constant	0.5835	0.9920	0.8000	0.7626	0.7750
	(0.026)	(0.062)	(0.072)	(0.047)	(0.055)
Married	0.2694	0.1988	0.2356	0.2104	0.1432
	(0.024)	(0.047)	(0.058)	(0.037)	(0.046)
Years of Education	0.1036	0.0845	0.0536	0.0794	0.0177
	(0.004)	(0.007)	(0.014)	(0.008)	(0.011)
Years of Employment	0.0178	0.0155	0.0164	0.0137	0.0137
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Adjusted R^2	.3922	0.3400	0.3394	0.2307	0.1734
F	431.4973	88.2342	48.4309	70.8895	36.9341
N	2,002	509	278	700	515
Mean Log Hourly Earnings	1.4411	1.9437	1.3779	1.3632	1.0846

Once again the model is also estimated for men only. Table 8 shows that the education coefficient for the secondary sector is again lower than for other sectors, with no such gap for experience, though the goodness of fit of the equation for the secondary sector is now somewhat higher.

Table 8: *Regression of Earnings of Employees on Marital Status, Years of Education, and Years of Employment for the Whole Sample and for Four Labour Market Segments, Males Only*

Variable	Whole Sample	Independent Primary Professional and Technical	Independent Primary Craft	Subordinate Primary	Secondary Market
Constant	0.7080	1.0272	0.7568	0.9840	0.8420
	(0.031)	(0.081)	(0.077)	(0.056)	(0.076)
Married	0.3451	0.3213	0.2733	0.2278	0.2593
	(0.030)	(0.071)	(0.063)	(0.043)	(0.074)
Years of Education	0.0957	0.0779	0.0597	0.0649	0.0176
	(0.005)	(0.008)	(0.015)	(0.009)	(0.017)
Years of Employment	0.0128	0.0111	0.0169	0.0074	0.0104
	(0.001)	(0.002)	(0.003)	(0.002)	(0.003)
Adjusted R^2	0.4162	0.3344	0.3711	0.1845	0.2700
F	292.4041	54.2545	49.7876	33.1997	29.3619
N	1,227	319	249	428	231
Mean Log Hourly Earnings	1.5488	1.9944	1.3997	1.4862	1.2103

Regression Results for Four Sector Full Model

We now add to the earnings function additional explanatory variables which may help to refine the estimates of the effects of the education and experience variables: time spent out of employment, male/female, marital status for men and women, whether employment is full-time or part-time, trade union membership, whether the employee is on an incremental pay scale, and whether s/he has an occupational pension entitlement. The square of both time spent in employment and out of employment are included to capture possible non-linearities in their effects. Part-time work is included because this form of employment is more prevalent in the secondary sector and part-time workers are expected to have lower earnings. Trade union membership is included because industrial unionism has a homogenising effect on job conditions, and this effect should be particularly strong in the primary sector in which most goods producing industries are found. Incremental pay scales are also a feature of primary sector employment, as is occupational pension entitlement.

It could be argued that some of these variables, such as trade union mem-bership or part-time working, may be endogenous in that they could be influenced by the wage. The issue of endogeneity in estimating such earnings functions runs deeper, in that an individual's investment in schooling itself may be influenced by its return. This may bias ordinary least squares estimates of the return to education, and a variety of approaches to tackling this problem as far as the education variable is concerned have been advanced (see for example Harmon and Walker (1995)). Even given the data required to implement these approaches, one would still be left with the potential endogeneity of, for example, trade union membership and the desirability of modelling earnings, participation, union membership etc. jointly. Here our much more limited aim is to implement the test of seg-mented labour market theory most commonly used in the literature, but now including these additional control variables to see the extent to which differences remain across sectors. The estimation results for the full sample are shown in Table 9.

Unlike the simple model, years of education now has a significant positive impact on earnings in the secondary sector, but the coefficient is less than half those for the independent primary craft sector and the subordinate primary sector, which are in turn below that for the independent primary professional and technical sector. The F-test for the full model again does not accept the null hypothesis that there is no difference between the regression equations. Taking the coefficients on years of employment and the squared term together, once again the impact of experience is not much less in the secondary sector than elsewhere, contrary to the predictions of the segmented labour market model and some US evidence. The corresponding results for men only are little different: the gap between the education coefficient for the secondary versus the other sectors is very similar to that found for the sample as a whole, and the goodness of fit of the equation for the secondary sector is again relatively low.

Testing Differences in Returns to Education and Work Experience
The four segment labour market model provides a number of testable hypotheses relating to differences in the returns to education and work experience in each segment. As far as education is concerned, returns in the independent primary professional and technical segment should be higher than in the independent primary craft, subordinate primary, or secondary segments. Returns in the independent primary craft segment are indeter-minate on theoretical grounds relative to the returns in the subordinate primary and secondary segments. Returns in the subordinate primary seg-ment should be higher than in the secondary segment. These hypotheses can

Table 9: *Regression of Earnings on Full Set of Explanatory Variables for the Whole Sample and Four Labour Market Segments*

Variable	Whole Sample	Independent Primary Prof. and Technical	Independent Primary Craft	Subordinate Primary Sector	Secondary Sector
Constant	0.4512	0.7499	0.5145	0.6316	0.6359
	(0.030)	(0.079)	(0.077)	(0.055)	(0.0597)
Female	−0.0621	0.0792	0.1469	−0.1163	−0.0968
	(0.027)	(0.071)	(0.090)	(0.040)	(0.047)
Married man	0.1488	0.1584	0.0334	0.0919	0.1344
	(0.029)	(0.069)	(0.060)	(0.042)	(0.063)
Married woman	0.1256	0.0453	−0.1596	0.1172	0.1017
	(0.032)	(0.062)	(0.125)	(0.051)	(0.059)
Years of Education	0.0825	0.0725	0.0562	0.0550	0.0249
	(0.004)	(0.006)	(0.013)	(0.008)	(0.010)
Years Employed	0.0389	0.0313	0.0573	0.0340	0.0266
	(0.003)	(0.006)	(0.007)	(0.005)	(0.005)
Years Employed^2	−0.0599	−0.0436	−0.0931	−0.0588	−0.0406
	(0.006)	(0.013)	(0.014)	(0.010)	(0.011)
Years Out of Employment	−0.0218	−0.0289	−0.0046	−0.0225	−0.0152
	(0.005)	(0.014)	(0.020)	(0.008)	(0.009)
Years Out of Employment^2	0.0574	0.0982	−0.0908	0.0538	0.0416
	(0.023)	(0.066)	(0.094)	(0.033)	(0.036)
Part-time	0.1457	0.3464	—	0.0977	0.1530
	(0.052)	(0.125)		(0.101)	(0.069)
Trade Union Member	0.1316	0.0557	0.0703	0.1365	0.2649
	(0.019)	(0.039)	(0.042)	(0.029)	(0.041)
Pension Entitlement	0.2880	0.3151	0.2209	0.2383	0.2582
	(0.022)	(0.046)	(0.045)	(0.033)	(0.049)
Incremental Scale	0.1026	0.0308	−0.021	0.1106	0.1824
	(0.020)	(0.038)	(0.044)	(0.030)	(0.044)
Adjusted R^2	0.5579	0.4552	0.5276	0.4584	0.3729
F	211.4439	36.3688	29.1212	50.3064	26.4711
N	2,002	509	278	700	515

be tested with a standard t-test, and the results from the simple model are shown in Table 10.[4] The returns to education are indeed higher in the independent primary professional and technical segment than in the independent primary craft or the secondary segments, as predicted by the segmented

4. Following Fichtenbaum, *et. al.*, (1994), t-statistics are calculated on the basis that the sample variance of $(b_i - b_j)$ is equal to the variance of b_i plus the variance of b_j, and the co-variance (b_i, b_j) is zero since the segments are separate sub-groups.

labour market model, though they are not higher than in the subordinate
primary segment. The returns to education in the subordinate primary
segment are also higher than in the secondary sector as the model predicts.

Table 10: *Differences in Returns to Education in Four Labour*
Market Segments

Segment	Independent Primary Prof. and Technical	Independent Primary Craft	Subordinate Primary	Subordinate
Independent Primary Prof. and Technical	*	0.0309 (1.95)	0.0051 (0.47)	0.0668 (5.27)
Independent Primary Craft		*	−0.0258 (1.55)	0.0359 (2.01)
Subordinate Primary			*	0.0617 (4.50)
Secondary				*

As far as work experience is concerned, the segmentation model predicts
that returns in the independent primary craft segment should be higher —
than in all of the other segments — mainly because earnings in craft
occupations are strongly influenced by seniority. In addition, returns to work
experience in the subordinate primary segment should be higher than in the
secondary segment. None of these hypotheses are borne out by our results:
work experience has no differential effect on earnings in different labour
market segments in Ireland whereas it has a strong differential effect in
segmentation studies in the United States.

The Irish evidence thus support the predictions of the segmented model in
relation to returns to education but not returns to work experience. Similar
results can be derived from the estimated coefficients for men only and from
the full model. In addition to years of schooling, the dataset contains
information on the highest education level attained by respondents. When
these are entered in dummy variable form into the estimated equations for
the different sectors in place of years of education, the lower return to
education in the secondary sector is evident across the full range of
attainment levels.

V CONCLUSIONS

Dual or segmented labour market theory appears to be enjoying something
of a resurgence internationally in recent years, but up to this point little
attempt has been made to test or apply these ideas in empirical work on
the Irish labour market. This paper has implemented with Irish data

empirical tests of a core element of the segmented labour market model, the divergence between sectors in the way earnings are determined. Two different approaches to allocating employees between sectors have been used, one based on designating major industrial groups as primary or secondary sector, the second adapting the more refined procedure developed by Gordon for the USA, which relies on detailed job descriptions in the *Dictionary of Occupational Titles* to distinguish four sectors.

The results for Ireland with the four-way categorisation of labour market segments, for the entire sample and for men only, suggested that returns to education were indeed less in the secondary sector than elsewhere, and standard earnings functions explained less of the variance in earnings within the secondary sector than elsewhere, as predicted by the segmented labour market model. The secondary sector produced by the two-way industrial categorisation was less distinctive in these respects. Contrary to the predictions of the segmented labour market model, years of employment experience were seen to have as great an influence on earnings in the secondary sector as elsewhere with both categorisations. The divergence in estimated earnings functions between sectors in Ireland is a good deal less than that shown by a number of studies using US data, but results which have been produced for the UK suggest that there is also a less clear-cut divide there than in the USA (McNabb and Ryan, 1990). Among the factors which may underpin this contrast, the greater influence of trade unions throughout the economy — including the secondary sector — in Ireland and the UK suggests itself as a prominent candidate, given the importance placed by unions on rewards for seniority.

This matters because the implications of adopting a segmented labour market perspective are markedly different from those of simple human capital theory on some central issues in labour market policy. The human capital model predicts that investing in education and training of those with low skills will itself significantly raise their earnings and reduce inequality. The segmentation model, however, sees workers at the lower end of the earnings distribution as having the lowest returns to investment in education and training; and simply giving them more education and training will not alter the wage structure, suggesting a greater emphasis on policies directed at influencing the structure of jobs. The segmented labour market theory would also provide an alternative perspective on the impact of unemployment compensation and replacement rates on unemployment, as explored in for example Burda's (1990) model of "wait" unemployment and Atkinson and Micklewright's (1991) discussion of the impact of higher unemployment insurance coverage in the primary sector on the equilibrium wage and employment in that sector.

In the absence of evidence on rationing of primary sector jobs, the existence of distinct wage equations for the primary and secondary sectors does not constitute a refutation of human capital theory. However, the persistence of inter-industry and inter-employer wage differentials which cannot be explained by conventional human capital variables (see for example, Dickens and Katz (1987); and Krueger and Summers (1987), (1988)) has itself contributed to the perceived need to augment human capital theory by, for example, efficiency wage or rent-sharing models (which have also been directed at understanding unemployment). The segmented labour market perspective offers an alternative framework within which such non-market-clearing models may fit, but will have difficulty convincing the sceptic to take it seriously without a more developed theoretical foundation. Rather than representing a coherent theory in itself, the segmented labour market perspective appeals to a variety of theories, and a theoretical agnosticism underlies some of the testing procedures which have been applied. The priority for proponents of that perspective in our view has to be development of the microfoundations of the postulated links between product market characteristics and segmentation in the labour market, on which more precise and testable propositions can be based.[5] This does not mean that a knock-out refutation of human capital theory will be required before segmentation can become a mainstream perspective, but simply that a research programme which concentrates on development of its own underpinnings rather than on the limitations of human capital theory is more likely to be fruitful.

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5. The unsatisfactory nature of the present position is demonstrated by the exchanges between Dickens and Lang (1985, 1993) and Heckman and Hotz (1986) in which an important argument they use against each other is that neither human capital nor segmented labour market theory are in essence testable empirically.

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