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THE MICRO-LEVEL DYNAMICS OF DECLINING LABOUR SHARE: LESSONS FROM THE FINNISH GREAT LEAP***

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ABSTRACT: In contrast with the experiences of the UK and the US, the distribution of labour and capital income has changed sharply in favour of capital in most Continental European and Nordic countries during the past two decades. We examine forces behind the evolution of the aggregate labour share by analysing the dynamics of labour shares within and between firms/plants in the Finnish business sector. Using a decomposition method applied in labour economics and productivity analysis, we show that much of the decline in the aggregate labour share stems from the reallocation of resources between firms and plants, while labour shares at the firm/plant level have remained relatively stable.

Keywords: Factor income shares, wage policy, decomposition, productivity
JEL-code: J23, J24, D33

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TIIVISTELMÄ: Ison-Britannian ja Yhdysvaltojen kehityksestä poiketen funktionaalinen tulonjako on muuttunut pääoman hyväksi Manner-Euroopassa ja Pohjoismaissa parin viime vuosikymmenen aikana. Tutkimuksessa tarkastellaan aggregaattikehityksen taustalla olevia tekijöitä analysoimalla työn tulo-osuuden dynamiikkaa yritys- ja toimipaikkatasolla. Työn tulo-osuuden aggregaattimuutos hajotetaan yritys/toimipaikkatason komponentteihin hyödyntämällä työn taloustieteessä ja tuottavuustutkimuksessa käytettyä menetelmää. Tulosten mukaan iso osa työn tulo-osuuden aggregaattitason laskusta selittyy resurssien uudelleen allokoitumisella yritysten ja toimipaikkojen välillä. Vastaavasti työn tulo-osuudet yritys- ja toimipaikkatasolla ovat muuttuneet paljon vähemmän.

Avainsanat: Tuotannontekijätulot, palkkapolitiikka, dekomponointi, tuottavuus
JEL-luokittelu: J23, J24, D33

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1 Introduction

The incessant adoption of new technologies from the world technology frontier and active engagement in innovation activities characterizes economic growth in developed countries. Worker reallocation from less productive to more productive firms is viewed as an important source of aggregate productivity growth (Bartelsman and Doms, 2000; Foster et al., 2001). To the extent that the implementation of new technologies requires the establishment of new production units, productivity growth stems from the process of creative destruction, where old jobs are continuously replaced by new ones with more advanced technologies. In the model of Aghion and Howitt (1994) an acceleration of embodied productivity growth enhances job creation by raising the expected returns from creating new jobs (the capitalization effect), but also induces job destruction and discourages job creation by reducing the duration of existing jobs (the creative destruction effect). The magnitude of these opposite effects depends on wage-setting institutions, which determine how the rents of existing and new matches are shared, and employment protection legislation, which affects the cost of labour turnover. As a consequence, various shocks can lead to very different labour market outcomes under different labour market institutions (see Blanchard and Wolfers, 2000, for some empirical evidence).

Wage compression via centralized bargaining can promote job and labour turnover by forcing less productive firms out of the market and increasing the entry of more productive firms as in the model of Moene and Wallerstein (1997). Therefore, centralized wage bargaining may enhance productivity growth via a more rapid adoption of new technologies. Moreover, centralization may increase firms' innovation investments by helping to reduce the hold-up problem associated with unionism (Haucap and Wey, 2004). On the other hand, stringent employment protection regulations, which tend to reduce labour turnover, are often implemented together with wage compression policies as pointed out by Bertola and Rogerson (1997).

Many economists believe that the interaction of shocks and different labour market institutions can account for much of the divergent patterns of labour market outcomes

and productivity growth between Europe and the United States over the past few decades. This argument relies on the claim that the economic environment has changed owing to globalization (Melitz, 2003), lower trade barriers (Bernard et al., 2006), and the adoption of new information technologies (Jovanovic and Rousseau, 2005; Acemoglu et al., 2006). Due to a change in circumstances, the same institutions that have worked well earlier may fail to generate satisfactory economic development.

Recent theoretical and empirical research emphasises the role of micro-structural change in productivity growth, i.e. the importance of the entry and exit of production units and reallocation between existing production units. For instance, evidence provided by Lentz and Mortensen (2005) for Denmark and by Maliranta (2005) and Böckerman and Maliranta (forthcoming) for Finland indicates that, because of extensive micro-level restructuring, the industry productivity growth rate may exceed the productivity growth rate of an average firm or plant by a factor of two or even more. As a stimulus of productivity-enhancing restructuring, the literature has emphasised the role of product market competition (e.g. Olley and Pakes, 1996), financial markets (e.g. Ramey and Shapiro, 2001), and labour markets (e.g. Caballero et al., 2004).

Since micro-level dynamics have been found to play such an important role in industry productivity growth, aggregate analyses of changes in labour shares should also be complemented with analyses with micro-level data. In this paper we argue, firstly, that it is essential to make a distinction between the Continental European countries (notably, Germany and France) and Nordic countries (Denmark, Finland, Sweden and Norway), as these countries differ in several respects (see e.g. Korkman, 2006). This point can be supported on theoretical and empirical grounds. Secondly, we contribute to the literature by decomposing changes in the aggregate labour share in Finland over the past two decades into the micro-level components. This novel feature of our analysis provides us with fresh insight into the role of labour market institutions during profound technological transformation. The period under investigation is particularly interesting. During this period Finland has changed from a closed and highly regulated economy to a modern open econ-

omy frequently ranked among the top economies in the world in terms of competitiveness and the use of information technologies.

We show that the decline in the labour share in Finland is essentially due to micro-level restructuring, which is the same process that in earlier studies has been found to be the main factor of productivity acceleration in Finland. In Continental Europe the mechanism behind the decline in the labour share may have been different. Institutional differences could explain why Continental Europe did not join the technological upsurge with the Nordic countries. Continental Europe has experienced a smaller decline in the labour share since the mid-1980s, has experienced regressive productivity growth and seems to have lacked "creative destruction" during the ICT era. A more extensive and efficient use of ICT has often been argued to be an important piece of the US success story. Gordon (2004) emphasise heterogeneity among European countries in this respect by pointing out a clear difference in the level of PC adoption and ICT expenditures between the US and the "olive-belt" region (Portugal, Spain, Italy, and Greece), whereas the Nordic countries are comparable to the US.

The paper's structure is as follows. In the next section we show that there are important institutional differences between Finland (and other Nordic countries) and Continental Europe (especially France and Germany). In Section 3 we report some stylized empirical facts for the OECD countries and give a brief description of macro-economic trends for Finland. In Section 4, we discuss methodological issues, which are relevant from the viewpoint of the micro-level dynamics of productivity growth and labour income share, and outline our decomposition method. Section 5 describes our data. Empirical analysis of the micro-level sources of changes in the aggregate labour share is presented in Section 6. Section 7 concludes.

2 Institutional conditions for micro-structural change

We argue that the Finnish labour market institutions tend to promote resource allocation between industries and, more importantly, between firms within industries. First, the

average wage growth is closely tied to economy-wide aggregates, and wage increases, both negotiated and realized ones, exhibit less industrial variation than economic conditions do. Second, strikes at the firm level are illegal, which hinders workers' efforts to extract firm-specific rents arising from positive demand shocks or new innovations. Third, the obstacles to establishing new firms are low. Fourth, the degree of employment protection is not particularly strict nor slack by international standards, being less strict than in most European countries. Below, we give a brief description of these institutional features.

2.1 Centralized wage setting

The Finnish labour market is characterised by a corporatist structure, where comprehensive unions and employers' associations bargain collectively over wages and working conditions in co-ordination with the government. Unions and employers' associations are formed along industrial lines, and they are further represented by their own central organisations. Within industries collective agreements are extended to also cover non-organised workers and employers, provided that the unionisation rate exceeds a certain threshold value. As a result, as much as some 95 per cent of all employer-employee relationships are regulated by collective agreements (Vartiainen, 1998).

Although the binding collective agreements are signed between industrial unions and their employer counterparts, wage negotiations are often co-ordinated at national level. If the goals of individual unions appear to be similar enough, the central organisations of unions and employers' organisations can agree about a centralised framework that specifies a common wage increase with a narrow range for industry differentials.[1] In this case the centralised agreement will come into effect as the unions make out their industry-specific agreements accordingly. If the negotiation between the central organisations fails,

[1]When bargaining takes place between the central organisations, the government is usually indirectly involved in these negotiations. The government may encourage the labour market parties to reach a moderate centralised agreement by making concessions about tax and policy issues, such as income taxes, unemployment benefits, active labour market policy and/or pension schemes. This can lead to a wide "income policy" agreement which implicitly covers a variety of labour market issues that are beyond the direct control of the labour market parties. In practice, co-ordination takes place in various informal forums, where the governmental officers meet the representatives of the employers' organisations and unions to discuss the topics of economic policy. One goal of such discussions is to search for a mutual understanding of the state of the economy, and hence of an "acceptable" range of wage increases for the next round of wage bargaining.

it is followed by an unco-ordinated round of bargaining, where each union enters into negotiations on its own terms. During the bargaining process the unions have an option to call a strike to intensify their wage claims, provided that the old agreement has expired. Strikes take place at the industry level. It should be stressed that the employees of individual firms cannot take strike action when the collective agreement is in force.

In addition to the average wage growth, the unions are concerned with unemployment and distributional issues. Solidarity wage policy, which offers roughly equal wage growth to all groups with an intention of wage compression, has been a vital union goal and enjoys much support among citizens (though not among employers). While the solidarity nature of the centralised agreement is obvious, such a goal may be present in the rounds of unco-ordinated wage bargaining as well. There is evidence that unions' wage claims are not independent of each other. While unions in profitable industries may bargain over industry-specific agreements on their own terms, the wage claims of unions in the weaker industries are tied to wage claims in other industries. It follows that industrial discrepancies in economic conditions are not fully accounted for in the collective agreements, even during unco-ordinated rounds of bargaining. Moreover, wage increases followed by the unco-ordinated rounds are found to be higher on average (Koskela and Uusitalo, 2003). This supports the view that the high degree of centralisation in wage bargaining leads to wage moderation due to the internalisation of the cost of unemployment.

[Table 1 about here]

The degrees of centralization and co-ordination as well as the coverage of wage agreements are extremely high in Finland by international standards (see Table 1). These were common characteristics of the Nordic countries for a long time. In the late 1970s Sweden and Denmark were ranked among the countries with the highest degree of centralisation and co-ordination in wage bargaining along with Finland (see OECD, 2006). However, during the past decades Sweden and Denmark have moved in the direction of more decentralized and less co-ordinated systems, which is reflected in figures in Table 1.

Finally, wages at the individual level in Finland are rather rigid compared with those

of most other countries. According to the findings of the International Wage Flexibility Project, Finland has the second highest level of real wage rigidity among 15 European countries and the United States (Dickens et al., forthcoming).

2.2 Employment protection

Employment protection legislation comprises rules to protect workers against individual dismissals, specific requirements for collective dismissals, and regulation of temporary employment contracts. In Finland the period of notice for individual dismissals increases with job tenure from one to six months, being the longest for employees with tenure of 15 years or more. There is no mandatory severance pay. Fixed-term contracts are allowed for temporary replacements, traineeship, and particular business conditions. In the case of collective dismissals the unions must be consulted. In the recent ranking of overall strictness of employment protection made by OECD (2006), Finland is ranked as number 14 among 28 countries (see Table 1). In particular, Finland is close to the OECD average, having less strict employment protection than most of the European countries. The exceptions include Ireland, Switzerland, Hungary, Denmark, and the Czech Republic.

2.3 Conditions for business creation

Besides speeding up business failures, wage compression rewards, and thus encourages, successful market entries. By making rationalisation a feasible option if the entry turns out to be less flourishing, Finnish moderate employment legislation works in the same direction with wage compression. Further, various regulatory reforms launched after the mid-1980s paved the way for the renewal of the Finnish production structures. Market openness and competition were promoted by various means. Capital markets were liberalized, licences abolished, technical standards reformed, monopolies dismantled and state-owned companies reorganized. The extensive price regulation system was dissolved in 1988 (OECD, 2003b). In particular, deregulation steps taken in the telecommunication sector in the late 1980s were exceptionally strong even on an international scale. All these policy actions seem to have made Finland a true laissez-faire economy, comparable to

Switzerland, New Zealand, the United Kingdom and Canada according to the indicators documented by Pryor (2002).

Despite recent positive advancements, some people still argue that administrative barriers are a major obstacle to starting a business in many EU countries (see e.g. Commission of the European Communities, 2003). The Fraser Institute compiles an index of the ease of starting a new business (Fraser Institute, 2002). This is based on data from the World Economic Forum's Global Competitiveness Report, which includes surveys of business-makers. This survey deals with businesses' perception of regulation. According to this index, starting new business in Finland was easiest in the world both in 1995 and 2000, and the United States took second place. Sweden and Denmark rank higher than Germany, France and Italy. Indicators in the OECD International Regulation Database also indicate that conditions for entry are favourable in Finland. According to this data source, the administrative burdens on start-ups are lower in Finland than in Germany or France, for instance.

So, Finland appears to have sound conditions for nourishing creative destruction process by entries. Indeed, empirical evidence by Maliranta (2003) gives support to such a view by making two findings from Finnish manufacturing industries. First, productivity-enhancing intra-industry restructuring strongly contributed to productivity growth from the mid-1980s. Second, the major part of this process can be attributed to plants that were established in the latter part of the 1980s.

3 Background

3.1 Some empirical observations

Divergent patterns of labour market outcomes between Europe and the United States over the past few decades have been the subject of much attention. The poor unemployment development in Europe has been associated with relatively stable wage inequality and a decline in the labour share, though the European averages hide a great deal of heterogeneity across countries. By contrast, the US (and the UK) has experienced an increase

in wage inequality while the labour share has remained stable and unemployment at a low level.

[Figure 1 about here]

Figure 1 shows the evolution of labour shares in the business sector since 1982 for selected OECD countries. It points to smooth declining paths, starting in the early or mid-1980s, for most economies in Continental Europe and sharp declines in the 1990s for the Nordic economies. These findings are in clear contrast to the US, the UK, and Japan, where the labour shares exhibit stable paths over the period. It is illustrative to contrast these long-term patterns of the labour shares with the estimates of average annual multi-factor productivity growth rates shown in Figure 2. In the 1990s productivity growth has been fastest in Ireland (4.41 per cent) and Finland (3.16 per cent), both of which experienced the sharpest drops in the labour share.[2] Other Nordic countries (Norway, Sweden, and Denmark), which have labour market institutions quite similar to Finland, experienced declines in labour shares in the 1990s that were entailed with high multi-factor productivity growth rates, too. By contrast, countries with stable labour shares seem to have experienced clearly less rapid technological progress, the US with 1.13 per cent, the UK with 0.74 per cent and Japan with 1.02 per cent growth rate of multi-factor productivity in the 1990s. These observations give some support to the technology-related explanations of the factor income share changes. Rapid productivity growth among the Nordic countries, especially in the 1990s, is documented in several studies (see e.g. Bartelsman et al., 2004, p. 28; OECD, 2005, p. 183; Gordon, 2006). Usually the high productivity performance in Nordic countries is linked to ICT.

[Figure 2 about here]

An additional piece of motivation comes from some findings made in the OECD's firm-level growth project that involved micro-level decompositions of productivity growth.

[2] In Ireland the series of moderate tripartite wage agreements took place in the 1990s in an attempt to retain competitiveness and improve employment during a period of rapid growth in labour productivity (OECD, 2004, p. 156). The government encouraged moderate wage claims by cutting taxes and improving social benefits. Interestingly, Finland has followed a similar policy over the same period (see discussion below).

Those computations shed some further light on the differences in productivity growth rates across countries. According to the results reported in OECD (2003a), the restructuring components (between, entry and exit) together had no contribution whatsoever to labour productivity growth in US manufacturing in the years 1992-97. The respective number in the UK was 0.7 percentage points per year. On the other hand, productivity increases through reallocation of labour at the micro-level were substantially higher in Finland, the respective number being 2.2 percentage points per year in the years 1989-94.

A study by Maliranta and Rouvinen (2004) employing micro-data indicates that the use of ICT has had a significant effect on productivity in ICT producing and using manufacturing and service industries in Finland. What is particularly interesting for our analysis is that the study also finds evidence on the importance of micro-structural change by showing that the use of ICT has a stronger positive effect on productivity in younger firms. Pilat (2004) provides a review of studies on the productivity effects of ICT.

3.2 The macro-economic environment in Finland

The beginning of the early 1980s was a time of steady economic growth but there was an overheating of the economy in the last years of the decade. The liberalization of the monetary markets in the mid-1980s was followed by an expansion in bank credits and a huge rise in asset prices. At the end of the 1980s the annual growth of the GNP was around 5 per cent and the unemployment rate within a range of 3 and 5 per cent. However, the falling export prices, rapid domestic inflation, and the collapse of the Soviet Union in 1991, with which Finland's foreign trade was notable at that time, led to speculative attacks against the Finnish markka, which was allowed to float in 1993 after a defensive battle. High interest rates and falling asset prices ran over-indebted firms into financial problems. This caused a wave of bankruptcies, and large-scale job destruction took place in virtually every sector of the economy. The GNP contracted three years in a row (1991–1993), and in the worst year of 1991 the GNP decreased by over 7 per cent. The unemployment rate increased from 3 to close to 20 per cent between 1990 and 1994, even though masses of people were removed from unemployment and directed to active

labour market programmes.

The deep depression was followed by a strong recovery period. Exports turned on a path of strong growth already in 1992. The same occurred in the aggregate economy with a delay of two years, and the average growth rate of the GNP was around 5 per cent between 1994 and 2000. However, economic growth was built entirely on the export sector for a long time. Whereas the volume of exports doubled during the 1990s, record-high unemployment and households' debt problems, which the high interest rates and the collapse of asset prices had made worse, kept domestic demand below its pre-depression level up to 1999.

Not surprisingly, the economic crisis and mass unemployment were reflected in the collective wage agreements in the 1990s. Apart from the industry-specific wage agreements in 1994, the 1990s was a time of comprehensive centralized agreements, characterized by moderate wage increases. Economy-wide wage moderation was seen as a means of minimizing industrial disputes and protecting the competitiveness of the export sector. These agreements were strongly supported by the government, which cut income taxes to compensate unions for wage moderation. Afterwards this strategy looks relatively successful: aggregate production and employment grew rapidly up to the end of the decade without inflationary pressures, although unemployment remained at a high level (which was partly due to increases in the labour supply). On the other hand, equal wage growth over a period of large industrial discrepancies in economic development led to distributional changes between labour and capital in some industries.

At the turn of the new millennium the Finnish economy had recovered from the depression in terms of many macro-economic indicators. The economic environment was, however, fundamentally changed from the times preceding the depression years. As part of the economic integration and deregulation within Europe and globally, Finnish firms had to respond to increasing international competition. A wave of mergers has taken place both within and across the border. The export-led recovery was associated with a rapid structural change towards high-tech industries. The increasing importance of ICT has

been exceptionally sharp in Finland, which is, in large part, attributable to the rise of the mobile phone industry dominated by Nokia. For example, the volume of the exports of electrical equipment multiplied during the 1990s, which, in fact, explains a large fraction of the overall increase in exports.

Gross and net job creation increased very strongly in many Finnish sectors and industries, but in the manufacturing sector and the electronics industry in particular (Ilmakunnas and Maliranta, 2003). Labour demand was particularly high among high productivity and profitable plants and firms, which led to productivity-enhancing micro-level restructuring within sectors and industries.

4 Decomposing the aggregate labour share

4.1 Basic concepts

The starting point of our study is the simple fact that aggregate labour share declines when aggregate labour productivity growth exceeds aggregate wage growth (measured in product prices). The great majority of studies in this literature assume explicitly or implicitly that these aggregate changes represent changes in a representative firm, and, as a consequence, the role of selection and restructuring at the level of plants or firms is totally ignored. The point of departure of our study is to abandon the representative firm framework and have a look at the different micro-level sources.

In the following we make our point more formally. Aggregate labour share F is

$$F = \frac{W}{V} = \frac{W/L}{V/L}, \tag{1}$$

where W is the wage sum (also including supplements etc.) in product prices, V is real value added and L is labour input. Because the wage sum is expressed in product wages, this ratio indicates the nominal labour share.

The growth rate of the aggregate labour share is then the difference between the growth rates of aggregate wage and labour productivity:

$$d\ln F = d\ln\left(W/L\right) - d\ln(V/L). \tag{2}$$

The literature provides various methods to decompose continuous aggregate productivity change rates into different components by using discrete micro-level data. Typically, they include within (WH), between (or reallocation) (BW), entry (ENT) and exit (EXIT) components, so that

$$d\ln(V/L) \approx (\dot{V/L})_{WH} + (\dot{V/L})_{BW} + (\dot{V/L})_{ENT} + (\dot{V/L})_{EXIT}. \tag{3}$$

The set of micro-level components and their interpretation vary to some degree between methods. In the computations by Maliranta (1997, 2003), Diewert and Fox (2005) and Petrin and Levinsohn (2006) the within component measures the weighted average of firm-level productivity growth rates. So, aggregate productivity growth is the average firm productivity growth rate plus reallocation of inputs among firms (see also Basu and Fernald, 2002, p. 978). In the decomposition methods preferred by Maliranta (1997, 2003) and Diewert and Fox (2005), the reallocation effect consists of the restructuring between the continuing plants as well as the entries and exits of the firms. In more popular methods at present such as those advocated by Foster et al. (2001), and used, for instance, by Disney et al. (2003), the within component is equal to the average productivity growth rate multiplied by the employment (or output) share of continuing plants. In addition, the interpretation of the entry and exit components of these studies differs significantly. See the extensive discussion in Maliranta (2003) and Diewert and Fox (2005).

Obviously, the aggregate wage growth rate can be decomposed in an analogous way as

$$d\ln(W/L) \approx (\dot{W/L})_{WH} + (\dot{W/L})_{BW} + (\dot{W/L})_{ENT} + (\dot{W/L})_{EXIT}. \tag{4}$$

By substituting (3) and (4) into (2), we obtain the following decomposition for the growth in the aggregate labour share:

$$\begin{aligned} d\ln F \approx\ & (\dot{W/L})_{WH} - (\dot{V/L})_{WH} + (\dot{W/L})_{BW} - (\dot{V/L})_{BW} \\ & + (\dot{W/L})_{ENT} - (\dot{V/L})_{ENT} + (\dot{W/L})_{EXIT} - (\dot{V/L})_{EXIT} \end{aligned} \tag{5}$$

There is quite a wide consensus in Finland that the wage growth should be close to the national aggregate labour productivity growth. Aiming at that target, the agreements

determine the minimum wage increases that each employer should give their (incumbent) employees. Essentially, these agreements thus set the minimum wage growth rate for each firm. In practice, a firm's wage growth rate might be sometimes smaller due to the turnover of workers, for instance.

Suppose that the economy is hit by a technological shock which enhances productivity growth via the increased entry of firms with more advanced technologies and reallocation among incumbent firms towards those able to adopt new technologies. During a rapid embodied technology change the national aggregate productivity growth rate may exceed the within firm productivity growth rate by a wide margin. When the common wage increases are determined by (an estimate of) aggregate productivity growth, we should expect in this case that

$$(\dot{W/L})_{WH} - (\dot{V/L})_{WH} > 0,$$

which means that the labour share increases (and profitability declines) within firms. As a consequence, a profound technological shock under a solidarity wage policy may further boost productivity enhancing-restructuring, i.e. positive entry, exit and between components of productivity growth. On the other hand, by curbing wage dispersion between firms, a wage policy based on solidarity, and aiming for wage compression, tends to keep these respective components of wage growth close to zero.[3] All in all, a solidarity wage policy combined with a profound technological change can be expected to be associated with

$$(\dot{W/L})_{BW} - (\dot{V/L})_{BW} < 0,$$
$$(\dot{W/L})_{ENT} - (\dot{V/L})_{ENT} < 0,$$
$$(\dot{W/L})_{EXIT} - (\dot{V/L})_{EXIT} < 0.$$

In sum, a declining aggregate labour share may be a combination of quite different factors, and thereby it is worthwhile analysing the micro-level sources of the changes in labour

[3]Indeed, Maliranta (2003) finds that the between component of wage growth has been astonishingly close to zero in the Finnish manufacturing sector during the period 1975-2000, while the cumulative effect of the between component of labour productivity growth has been 20 percentage points during the same period.

shares.

4.2 Decomposition for the labour share

We denote the labour share of production unit (firm or plant) i in period t with $f_{it} = w_{it}/v_{it}$, where w_{it} is the wage sum and v_{it} is value added, both of which are now measured in nominal terms. We wish to decompose the change in the aggregate labour share from period s to period t. Units appearing in periods s or t are classified into three groups: those appearing in both s and t, i.e. continuing units indicated by C, those appearing in t but not in s, i.e. entrants indicated by E and those appearing in s but not in t, i.e. disappearing units indicated by D. The change in the aggregate labour share can be decomposed as

$$F_t - F_s = \sum_{i \in C} \overline{s}_i \left(f_{it} - f_{is}\right) + \sum_{i \in C} \overline{f}_i \left(s_{it} - s_{is}\right) + S_t^E \left(F_t^E - F_t^C\right) - S_t^D \left(F_s^D - F_s^C\right) \quad (6)$$

where $F_t = \sum_i w_{it} / \sum_i v_{it}$ is the aggregate labour share in period t; $s_{it} = v_{it} / \sum_{j \in C} v_{jt}$ is the weight of unit i as measured by its share of aggregate value added among continuing units; $F_t^X = \sum_{i \in X} w_{it} / \sum_{i \in X} v_{it}$ is the aggregate labour share among the group $X \in \{E, C, D\}$ in period t; $S_t^X = \sum_{i \in X} v_{it} / \sum_i v_{it}$ is the value added share of group $X \in \{E, D\}$; and $\overline{s}_i$ and $\overline{f}_i$ are the average values of s and f over the periods t and s for unit i, respectively.

According to equation (6) the change in the aggregate labour share can be decomposed into four components. The first term on the right-hand side of the equation is the within unit component, the second is the between units component, the third is the entry component and the fourth is the exit component. The within component is the weighted average of the changes in labour shares among the continuing units. The between component is positive when there is a systematic structural change in terms of value added towards those units that have a higher labour share. The sum of the within and the between components is the aggregate change in the labour share among the continuing units. Then the total effect of entries and exits is the difference between the total aggregate change in the labour share and the aggregate change in the labour share among the continuing units.

This method was proposed by Vainiomäki (1999) in his analysis of skill upgrading. The method is intuitively appealing. The entry term is positive if the labour share is higher among the new units in year t than among the older units, i.e. those who also appeared in period s. It can be seen that the entry effect is the larger the greater the proportion of new units is in terms of value added and the greater the difference is in the labour share between new and older units. The exit term is positive if the labour share is lower among those units that disappear before t than among those which still appear in t. The exit effect is the bigger the larger the proportion of exiting units is in terms of value added and the bigger the difference is in the labour share between exiting units and survivors.

Vainiomäki's method bears a resemblance to that of Berman et al. (1994) with an extension of also including the entry and exit components. Dunne at al. (1997) introduce another variant but the interpretation of the components is different. More recently, Diewert and Fox (2005, Eq. 30) propose a formula that is identical to that of Vainiomäki (1999). They also provide some discussion of the desirable properties of this method.

5 Data sets

5.1 Plant data for manufacturing

Longitudinal Data on Plants in Manufacturing (LDPM) is one of the two micro-level data sources used in this study. This data set is constructed especially for research purposes from the annual Industrial Statistics databases of Statistics Finland. In principle, a plant is defined in the Finnish Industrial Statistics survey as a local kind-of-activity unit. In other words, it is a specific physical location, which specialises in the production of certain types of products or services. A single local unit may consist of several plants that have activities in different industries. In some special cases a plant is delineated to include parts that are located geographically detached from it. However, it is required that the units are located within the same municipality. This solution seems to be well justified, especially when the geographically separated units are closely attached to each other operationally. This way of grouping plants may help firms to provide more accurate information on their

activities within a certain specific industry.

The Industrial Statistics survey annually compiles comprehensive information on the economic activity of industrial plants. This electronic database now contains information from 1974 to 2000. Up to 1994 it basically includes all plants with at least 5 persons. Since 1995 all plants owned by an enterprise with at least 20 persons have been included in the surveys. As there is a relatively large number of single-unit firms employing less than 20 (but more than 5) persons, the number of plants drops by almost one half due to this change in the applied criteria. However, the number of persons diminishes only moderately, by a few per cent. Thus, there is a break in the series between 1994 and 1995 that needs to be taken into account in handling and interpreting the time series. In particular, there may appear to be some artificial entries and exits in 1995. To correct this problem, for entry and exit numbers in the year 1995 we have used the average of the numbers of the years 1994 and 1996. As it comes to the within and between components, the break in time series does not have similar problems. This is because these components are computed by focusing on the continuing plants only in this particular method used in the present study.

5.2 Firm data for the business sector

The principal data source on firms is the Financial Statements Statistics (FSS), which is an annual survey conducted by Statistics Finland on the basis of corporate income statement and balance sheet data. The survey includes firms from manufacturing, construction, retail and wholesale trade, business services, accommodation and catering services, and transportation. Until 1996 (1995 in manufacturing and construction) the survey covered the entire population of firms above certain industry-specific size thresholds plus a stratified sample from the smaller firms. The stratified sample was rotated annually by replacing a fraction of the oldest companies in each stratum with new ones. The rotation sampling was applied to keep the survey representative in each point of time and to reduce the inquiry burden of smaller firms. In 1995/1996 the size thresholds were lowered but all firms below the new size thresholds were excluded from the survey. As a result, coverage

with respect to medium-size firms improved but all the data on small firms was lost.

In the first stage we combined the annual FSS surveys from 1989-1998. These data were complemented by adding records on small firms for the period 1994-1998 from the Business Tax Register. Whereas the information content is more limited, the Business Tax Register basically covers all firms. As a result, we have panel data for the selected industries, which cover the universe of the firms from 1994 to 1998 and a representative sample from 1989 to 1993. In the subsequent analysis we exclude all firms with less than five employees, as the data on very small firms is often noisy. This group of firms is not important in terms of employment or production.

Observations in the firm data refer to the accounting periods, which may deviate from the calendar years for some firms. A particular problem in the data is that firm identifiers may change for several reasons, such as in cases of a merger or of a change in ownership or industry classification. We have been able to correct such spurious changes in the firm identifiers to some extent. This is so because the firm records can be matched to the records of all employees of each firm (see Korkeamäki and Kyyrä, 2000, for details of the data). By following the worker flows between firms one can infer whether the entry and exit of firm identifiers in the data result from firm closures, births, takeovers, mergers, or some administrative reasons.

6 Results

We begin with an analysis of the plant data from the manufacturing sector. We have calculated the micro-components of changes in the aggregate labour share within 2-digit manufacturing industries using the decomposition formula (6). To give an overview of dynamics in the manufacturing sector, we show the cumulative effects for the period 1975-2001 in Figure 3, as obtained by aggregating industry-specific effects to the total manufacturing level. The aggregation over industries was performed using nominal value added as weights. This serves to eliminate the effect of structural shifts between industries. In the graphs we focus on the cumulative effects, as they are less noisy than the values

of individual components, which vary from year to year to a large extent. In addition, the averages of annual within and between components for the periods 1975-1990 and 1990-2001 by 2-digit industries are reported in Table 2.

[Figure 3 about here]

The bold line in Figure 3 points to a declining trend for the aggregate labour share, starting from the early 1980s. The other lines in the graph describe the relative importance of the underlying micro-level forces that are responsible for the aggregate development. The cumulative effect of the within component appears to be positive over the long run. From Table 2 we see that the within component is also typically positive within detailed industries. Thus at the plant level labour shares are typically growing, not declining as was the case at the aggregate level in the 1980s and 1990s. Discrepancy between developments at the micro and macro level is due to restructuring, i.e. the entry, exit and between components.

The between component is of particular interest because it captures the contribution of the reallocation of resources between continuing plants, which comprise some 80-85 per cent of the total annual labour reallocation in Finland. It is the most robust and reliable indicator of restructuring, especially at the detailed industry level. In many industries the between component is consistently negative from year to year. Consequently, the cumulative contribution of the between component is often very strong, despite its minor role in explaining the annual changes in the industry labour share. The numbers given in Table 2 show that restructuring tends to decrease the aggregate labour share in industries, the only exceptions being electrical machinery and coke and petroleum in the period 1975-90 and food, beverages and tobacco in the later period. We see particularly strong negative effects in the manufacture of radio, television and communication equipment and in the manufacture of office machinery and computers in the 1990s.

[Table 2 about here]

Not surprisingly, the between component in Figure 3 is strongly negative over the recession years, indicating that plants with low labour shares were raising their market shares as measured by nominal value added. This makes sense, as a low labour share points to a good financial position or to capital-intensive production technology, and among such plants the need to cut employment and production was probably lower than among other plants.

The entry and exit components, to the extent that they capture the impact of plant births and deaths, are closely related to the between component in describing the reallocation of resources in the market. The exit component is typically negative, indicating higher-than-average labour shares for plants exiting the market. Its cumulative effect is important but still smaller than that of the between component. Griliches and Regev (1995) provide evidence of the "shadow of death" tendency. It is common that the productivity level (labour share) of the exiting plant is below (above) the average level many years before the actual exit. Such a dying firm is likely to also have lower than average labour demand and thus its relative size decreases over the last years. So, an exiting plant or firm has usually contributed negatively to the between component during its "countdown" that may last several years. All in all, arguably the between and exit component largely gauge the same underlying renewal process.

The entry component has had a relatively neutral effect on the factor income shares over the observation period. On the other hand, the entry process, like exit process, is a time-consuming process. The initial productivity level of the new firms and plants is usually less and the labour income share more than that of incumbent ones. The group of young firms and plants is, however, particularly heterogeneous and subject to intensive selection in the subsequent years. This after-birth selection is likely to have a tendency to decrease the labour income share, and this should be reflected in the negative between component. Perfectly consistently with these considerations, Maliranta (2003) has showed that a disproportionately large part of the productivity-enhancing restructuring can be attributed to the relatively young plants.

When the economy was hit by the recession in the early 1990s, the labour shares within plants increased, which was followed by a period of falling labour shares. That is, the spike in the aggregate labour share in the early 1990s can be attributed almost entirely to the within component (see Figure 3). This dynamics can be explained by a delay between drops in production and employment. In the first stage, production fell rapidly, pushing the labour shares up. With a delay of about one year the plants reacted to this demand shock by laying off masses of workers. This, in turn, cut the wage sums and hence the labour shares in the second stage. As a result, the recovery that started in 1992-93 in manufacturing entailed about equally large cyclical rebound within plants.

Next we explore the importance of the changing industrial structure in explaining the aggregate development in manufacturing. Recall that this effect was controlled for in Figure 3. Table 2 indicated that the between component was quite negative in the manufacture of telecommunication equipment, which has been expanding rapidly over the past decade. In 1990 this industry accounted for less than 10 per cent of value added in manufacturing but in 2000 as much as a quarter of the manufacturing value added came from it. The ITC boom, boosted by the success of Nokia, is responsible for much of the rapid growth in the manufacture of telecommunication equipment. In order to check the effect of this particular industry, we have also performed computations by leaving this industry out. The general picture turns out to be reasonably similar.

[Figure 4 about here]

Furthermore, we have carried out the decomposition computations at the total manufacturing level. The discrepancy between these results and those derived by aggregating numbers from 2-digit industries indicates the role of the reallocation of nominal value added shares between industries. Figure 4 shows how much controlling the changes in industry structures affects the results. The within component is the same in both computations by construction and therefore it is not shown here. The cumulative between component turns out to be somewhat more negative when we allow for changes in the industry structure. A similar finding can be made for the exit component, too. The entry

component, on the other hand, behaves differently. While the entry effect has been quite insignificant within industries, it seems that the entry of plants has positively contributed to the aggregate labour share through industry-level restructuring. However, one should notice that the magnitude of this effect is very small compared with those of the exit and between components. Overall restructuring between industries has had a small negative effect on the aggregate labour share in manufacturing.

[Figure 5 about here]

Next we turn to the decomposition results obtained from the firm data. Figure 5 gives the cumulative effects over the period 1990-1998 for manufacturing, construction, retail and wholesale trade, business services, and accommodation and catering services. In the case of the firm data we have performed all decomposition computations at the sector level, not within industries within sectors. This is because the number of observations for the early 1990s is quite limited and because larger firms have multiple plants which may operate in different industries within the same sector.

From Figure 5a we see that in manufacturing the within and between components are roughly equally important and explain the major part of the fall in the aggregate labour share in the 1990s. In most periods the entry and exit components are of the same magnitude with the opposite signs. It follows that their joint effect is close to zero in each period as well as cumulatively over the observation period.

Note that the manufacturing results based on the plant data are replicated in Figure 5b for the period 1990-2001. Compared with the plant data results, the within component is lower and the between component is less negative on average in Figure 5a. This indicates that a significant fraction of micro-level restructuring takes place between the plants of multi-plant firms.[4] In other words, within firms higher profitability plants grow faster or are downsized less than lower profitability plants. The findings for the entry component obtained from the firm data suggest that a typical entrant firm has relatively low profitability (i.e. high labour income share). As we noted above, computations from the plant

[4] Disney et al. (2003) find that much of productivity growth in UK manufacturing is due to micro-level restructuring between plants within multi-unit firms.

level data yield a somewhat different result. An explanation for the discrepancy between plant and firm level results here is that the new plants established by an incumbent firm are, at least initially, more productive (i.e. have a lower labour income share) than the new plants established by a new firm (i.e. the plants established in the greenfield entry).

Not surprisingly, the exit component is typically negative from year to year. The picture for the entry component is less clear; it is consistently positive in manufacturing and trade but the opposite is true for construction and business services. Although we can see similarities in the time patterns of different components between the industries, the magnitude and relative importance of particular components vary a lot. This may not be so surprising once we recall the great discrepancy in economic conditions between sectors in the 1990s.

7 Conclusion

We found evidence that the decline in the aggregate labour share in the 1990s stems in large part from the reallocation of resources between firms and plants. In manufacturing, this reallocation process has taken place mainly within the industries, i.e. changes in industry structures play only a limited role in explaining the aggregate development. Within manufacturing industries much of the decline in the labour share is attributable to the between and exit components, which are negative from year to year. The cumulative effect of the within component, especially in the case of the plant data, has only a small contribution to the aggregate decline in the labour share in the 1990s.

In other words, the distribution of capital and labour income has been much more stable at the firm and plant level than at the industry level. This striking finding, which is beyond the aggregate level analysis, has two essential implications. First, attempts to hike the aggregate labour share up again via equal and high wage increases at the industry/economy level are likely to result in strong negative employment effects. This is because such a wage policy would evidently lead to a distributional change in favour of labour within firms, where employment decisions are made. Secondly, as a lesson for those

who are building theoretical models, our results highlight the importance of heterogeneity across firms/plants and turnover of labour and capital inputs in explaining movements in the aggregate labour share. Insights derived from macro-models of the representative firm should therefore be interpreted with great caution.

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A Weighted data version

Our data on firms is based on a stratified sample, where the probability of being included in the sample varies across strata, defined by industry and size of personnel. To deal with this type of the weighted data, the decomposition outlined in Section 4.2 must be modified.

Let ρ_{it} be the sampling weight of firm i in period t, i.e. the inverse of the sampling probability, which may change from year to year. Furthermore, let us denote the two-period average of the sampling weights by $\overline{\rho}_i = (\rho_{it} + \rho_{is})/2$. Then the weighted version of the decomposition is obtained by replacing F_t, s_{it}, $\overline{s}_i$, F_t^X and S_t^X, $X = \{E, C, D\}$, in equation (6) with the corresponding weighted terms:

$$\begin{aligned}
\widetilde{F}_t &= \frac{\sum_i \rho_{it} w_{it}}{\sum_i \rho_{it} v_{it}}, \\
\widetilde{s}_{it} &= \frac{\overline{\rho}_i v_{it}}{\sum_{j \in C} \overline{\rho}_i v_{jt}}, \\
\overline{\widetilde{s}}_i &= \frac{\widetilde{s}_{is} + \widetilde{s}_{it}}{2}, \\
\widetilde{F}_t^X &= \frac{\sum_{i \in X} \rho_{it} w_{it}}{\sum_{i \in X} \rho_{it} v_{it}} \quad \text{for } X = \{E, C, D\}; \\
\widetilde{S}_t^X &= \frac{\sum_{i \in X} \rho_{it} v_{it}}{\sum_i \rho_{it} v_{it}} \quad \text{for } X = \{E, C, D\}.
\end{aligned}$$

The terms for period s are modified in an analogous way.

Note that we use the two-period average of the sampling weights in computing $\widetilde{s}_i$. In doing so we eliminate the effect of variation in the sampling weights to the between component. However, as a consequence, the decomposition works only approximately, i.e. the sum of the within, between, entry, and exit components does not necessarily coincide to the aggregate change in the labour share, $\widetilde{F}_t - \widetilde{F}_s$. In our empirical application, the approximate decomposition is found to perform sufficiently well.

Table 1: Indexes of institutional characteristics

	Wage bargaining, 1995-2000		Employment protection 2003		Ease of starting a new business		Use of computers at work in 2002
	Centr.	Co-ord.			1995	2000	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Australia	2	2	1.47	(6.)	..	..	..
Austria	3	4	2.15	(16.)	3.7	5.4	62
Belgium	3	(4.5)	2.50	(20.)	4.6	6.4	53
Canada	1	1	1.13	(3.)	..	..	..
Czech Republic	1	1	1.94	(12.)	..	..	..
Denmark	2	(4)	1.83	(11.)	6.3	6.5	72
Estonia	..	..	..		..	..	36
Finland	**5**	**5**	**2.12**	**(14.)**	**8.5**	**8.8**	**70**
France	2	2	2.89	(23.)	3.4	5.2	45
Germany	3	4	2.47	(19.)	5	6.4	57
Greece	..	..	2.90	(24.)	..	..	35
Hungary	1	1	1.75	(9.)	..	..	..
Ireland	4	4	1.32	(5.)	..	..	46
Italy	2	4	2.44	(18.)	4.1	5.1	59
Japan	1	4	1.79	(10.)	..	..	..
Korea	1	1	2.00	(13.)	..	..	..
Luxembourg	..	..	..		..	..	56
Mexico	..	..	3.23	(26.)	..	..	..
Netherlands	3	4	2.27	(17.)	7.5	7.6	73
New Zealand	1	1	1.29	(4.)	..	..	..
Norway	(4.5)	(4.5)	2.61	(21.)	..	..	..
Poland	1	1	2.14	(15.)	..	..	..
Portugal	4	4	3.49	(27.)	4.3	5.7	32
Slovak Republic	2	2	1.60	(8.)	..	..	..
Spain	3	3	3.07	(25.)	5.3	5.7	..
Sweden	3	3	2.62	(22.)	5.1	7.9	73
Switzerland	2	4	1.60	(7.)	..	..	..
United Kingdom	1	1	1.10	(2.)	8.1	7.7	58
United States	1	1	0.65	(1.)	8.4	8.4	..
Turkey	..	..	3.49	(28.)	..	..	..
Scale	1–5	1–5	0–6		1–10	1–10	%
Source	OECD		OECD		Fraser Institute		Eurostat

Notes: Figures in brackets in Columns 1 and 2 are period averages in cases where at least two years differ from the period's modal value. A higher value of the index in Columns 1-3 indicates a higher degree of centralisation and co-ordination in wage bargaining and more stringent employment protection legislation, respectively. Figures in brackets in Column 4 show the ranking of overall employment protection strictness. A higher value of the index in Columns 5 and 6 indicates fewer administrative obstacles for establishing a new business. For further details see OECD Economic Outlook 2006, the Fraser Institute's Economic Freedom of the World: 2002 Annual Report, and Eurostat's Statistics on the Information Society.

Table 2: Within and between components of labour income share change, the annual average

		1975-1990		1990-2001	
Nace	Industry	Within	Between	Within	Between
15-16	Food, beverages and tobacco	1.6	–0.6	0.1	0.0
17-19	Textiles, leather and products	2.1	–0.6	0.4	–0.8
20	Wood	–1.0	–0.5	1.6	–0.8
21	Pulp, paper and products	0.4	–0.6	–0.9	–0.4
22	Publishing and printing	0.8	–0.3	–0.2	–0.3
23	Coke and petroleum	6.3	0.4	9.5	–1.0
24	Chemicals	0.5	–0.6	0.0	–0.6
25	Rubber and plastic	0.0	–0.2	0.5	–0.5
26	Non-metallic minerals	0.5	–0.4	0.0	–0.5
27	Basic metals	0.8	–0.5	–1.6	–0.2
28	Fabricated metal products	1.1	–0.4	0.8	–0.6
29	Machinery and equipment	0.8	–0.5	0.5	–0.5
30	Office machinery and computers	–0.1	–0.5	4.6	–1.1
31	Electrical machinery	0.0	0.0	0.3	–0.8
32	Radio, television and communication equipment	–0.3	–2.0	1.0	–1.3
33	Instruments	1.4	–1.4	–0.7	–0.4
34	Motor vehicles	–1.3	–0.4	1.0	–0.2
35	Other transport	1.0	–0.8	–3.3	–0.8
36	Furniture, n.e.c	0.7	–0.6	1.4	–0.3
	Unweighted average	0.798	–0.555	0.797	–0.577

Figure 1: Labour shares in the business sector for some OECD countries (Source: OECD, 1998)

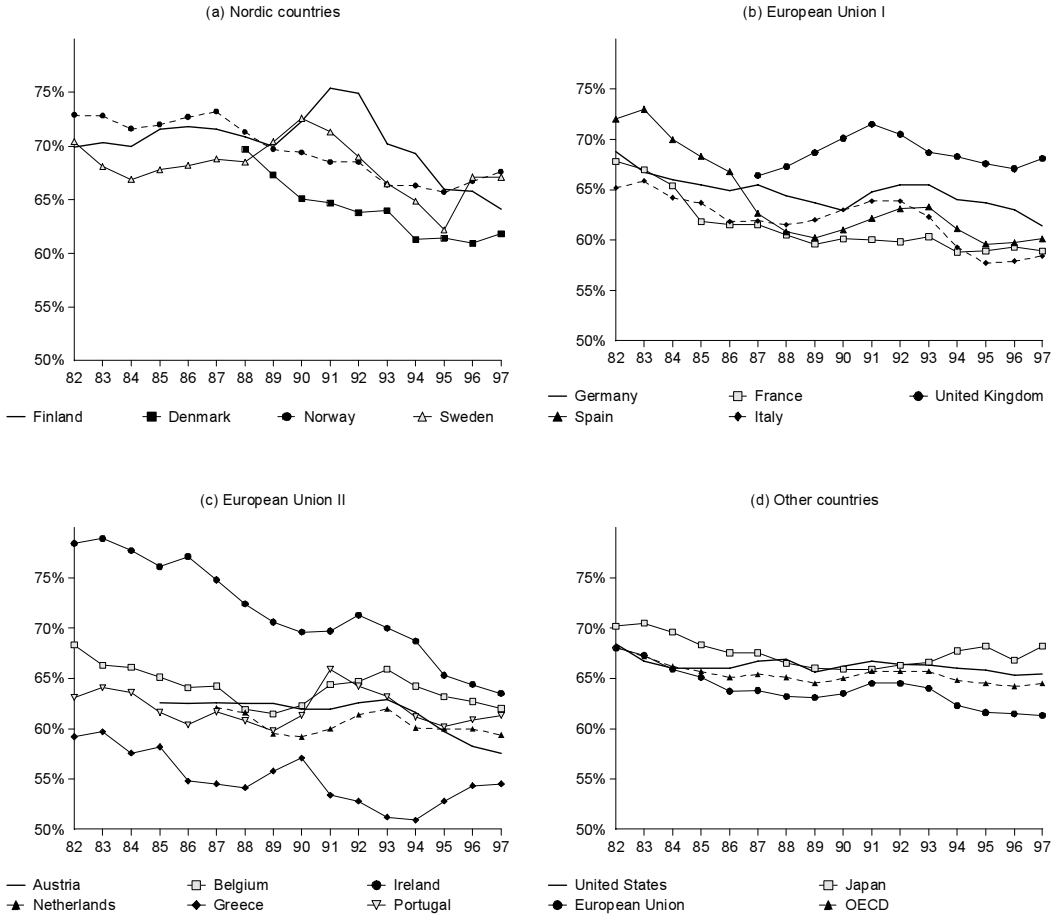


Figure 2: Multi-factor productivity growth estimates for some OECD countries (Source: OECD, 2003a)

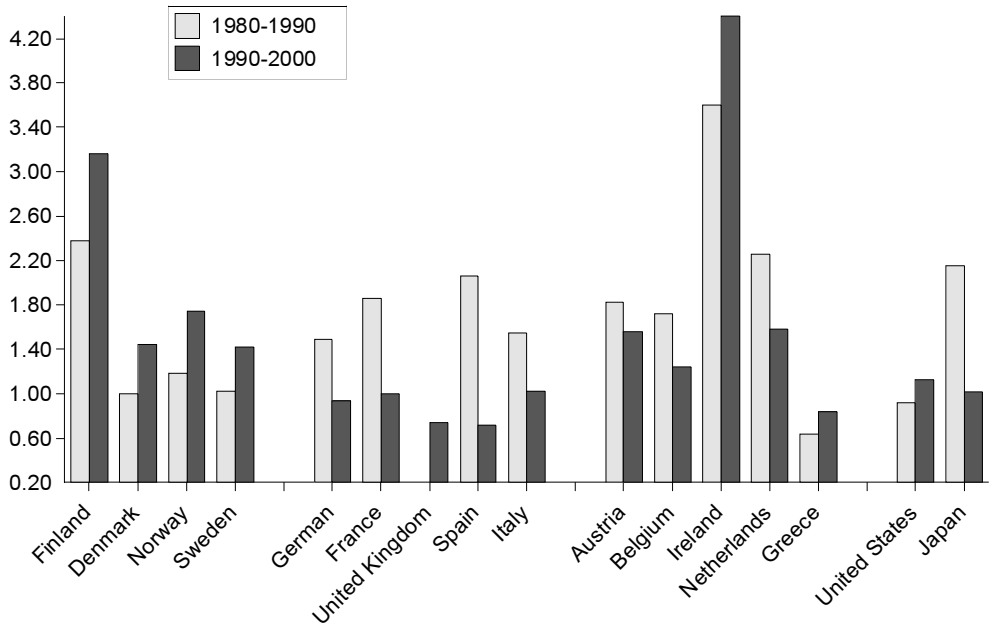


Figure 3: Cumulative effects of micro-level sources of labour income share change within 2-digit manufacturing industries

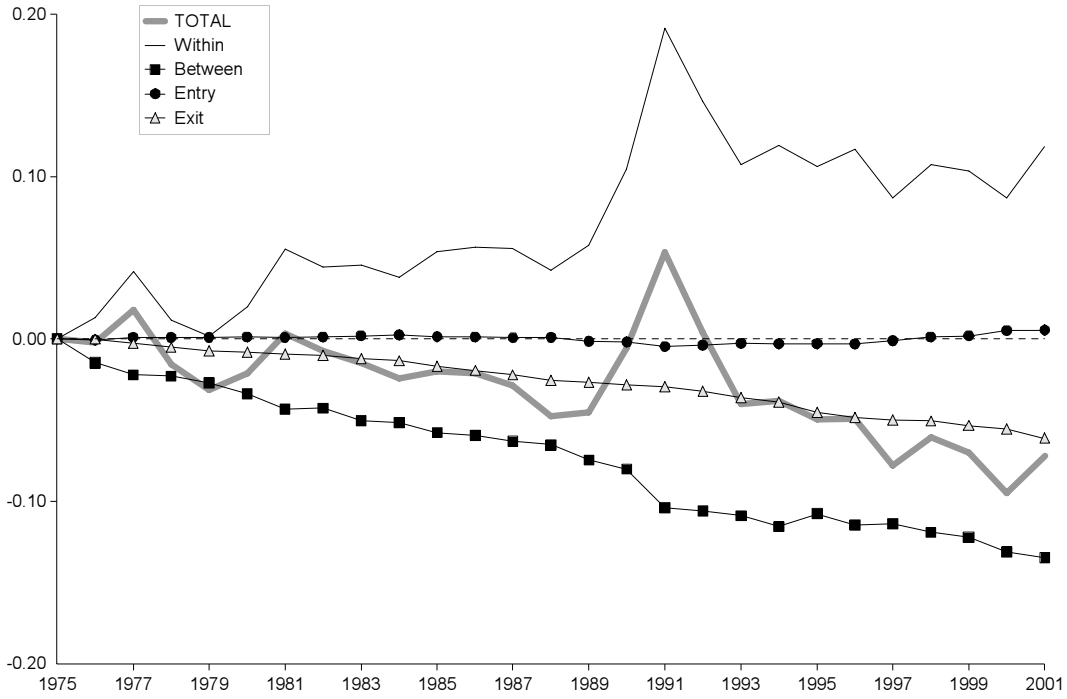


Figure 4: Discrepancy in the components at the total manufacturing and 2-digit industry level (the role of industry level restructuring)

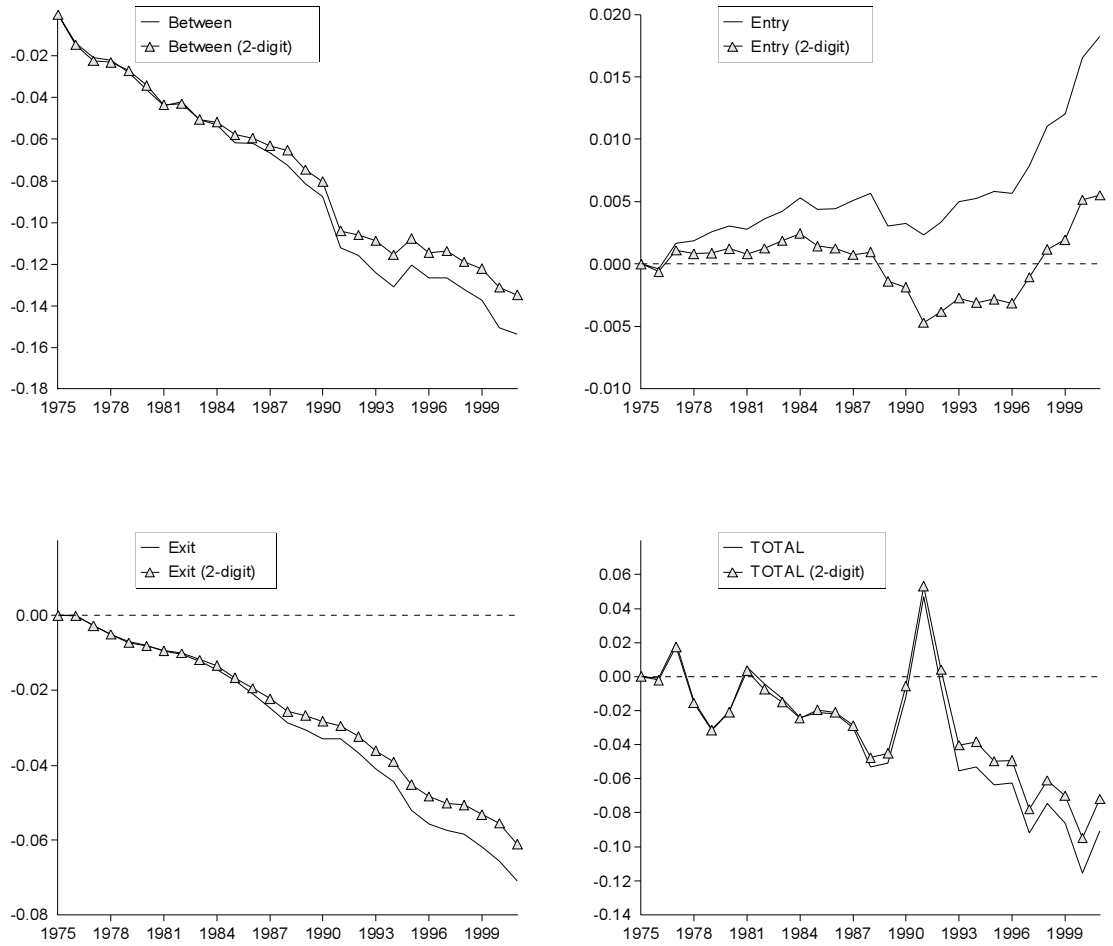
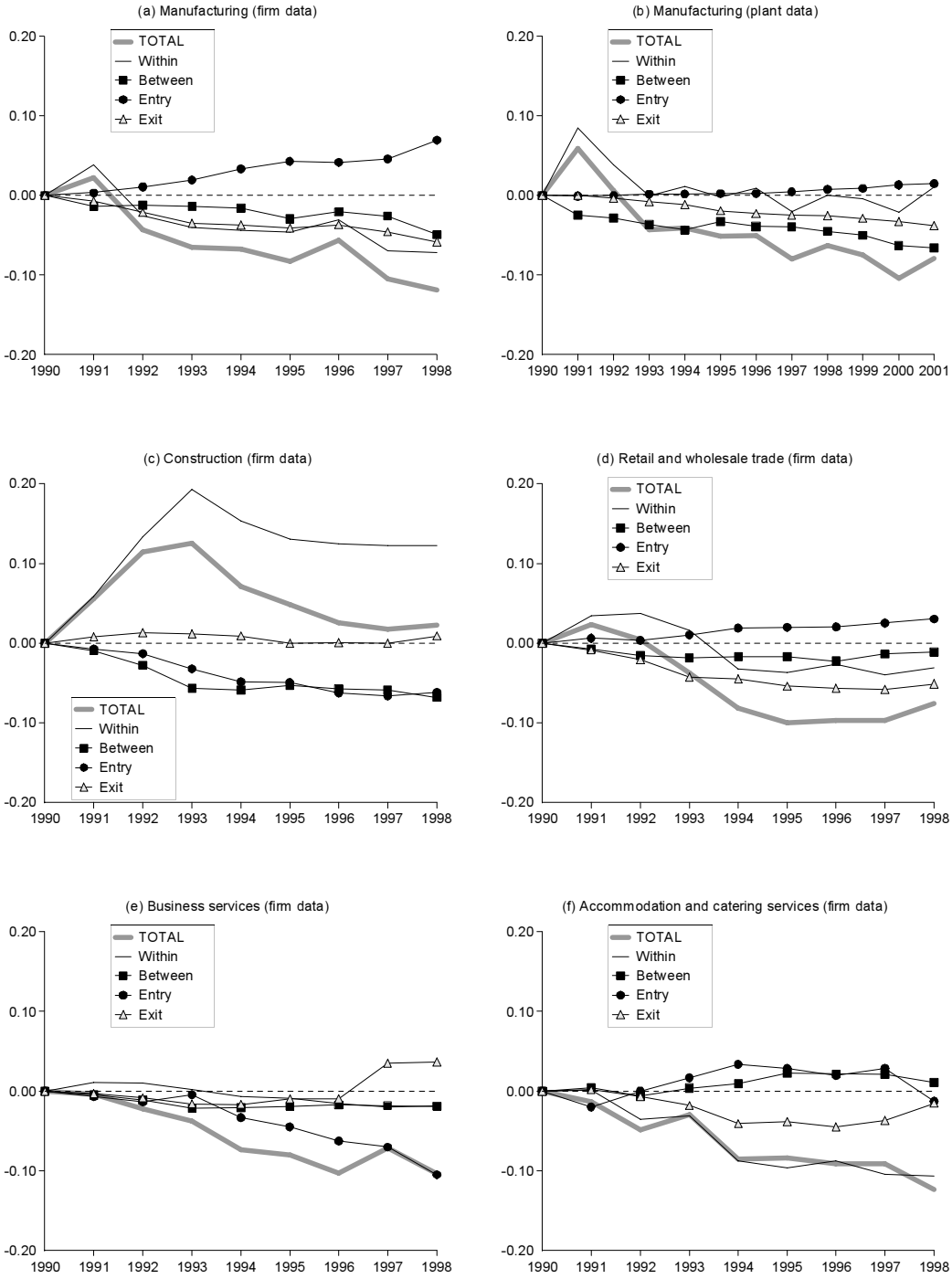


Figure 5: Cumulative effects from firm data



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