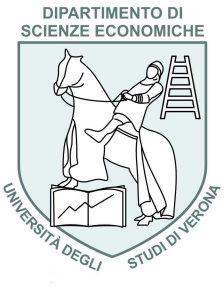

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Abstract

Under less restrictive assumptions than in previous contributions, this paper highlights various general patterns of profit rate dynamics. Without a substantial re-distribution of income in favour of profits, the profit rate declines. When labour productivity is weak the profits/wages ratio declines leading to a decline in the profit rate, also due to capital deepening. Developments in the capital-labour ratio tend to increase the organic composition of capital while those in the ratio between the capital price deflator and the average wage tend to decrease it. Falls in the profit rate took place in countries with a weak technological change with episodes of Marxian bias. Employment shifted from low to high capital intensity sectors, from low to high organic composition industries and from low to high productivity sectors. Rising strength of labour and realization failures tend to have a greater role than rising organic composition in cyclical profit rate dynamics. Over the cycle, the first mechanism is also the first one to show up, while the others tend to follow it.

Keywords: Profits, Wages, Labour productivity, Organic composition of capital, Capital intensity

JEL Codes: P17, E11, J30.

1 Introduction

The present paper contributes to the empirical analysis of the interweaving of income distribution, structural change, technical change and profit rate dynamics, where by profit rate we mean the ratio of total profits over the capital stock. We do so by introducing a number of novelties to the relevant literature. First we highlight the impact on the aggregate profit rate of sectoral developments not only in technical change, but in income distribution too. This is particularly important on several grounds. In the first place, when analysing economies on a time period of some decades it is not said profit rate or real wage equalization takes really place as either shocks might be highly persistent or there might be barriers to capital mobility – see Duménil and Levy (1993, pp. 155) - in the form of, for instance, sectoral differences in industrial relations, innovation capabilities, barriers to firms' entries and exits, capital market imperfections. In the second place, the hypothesis of gravitation of profit rates was recently criticized on theoretical grounds (Dupertuis and Sinha, 2009) and it has found a mixed empirical support (Vaona 2010a, b). Finally, as showed below, supposing that income distribution is the same across sectors might hide the effect on the aggregate profit rate of labour re-allocation from less to more productive industries. Regarding this issue, in the present work we will make use of panel unit root tests to understand whether sectoral profits/wage bill ratios displayed a mean reverting behavior.

A second novelty of this paper is the analysis of countries (Finland, Denmark and Italy) that have so far been overlooked by the literature. Our choice of these countries is largely determined by data availability, as they are those with the most complete information in the STAN OECD database. However, these countries carry a particular economic interest as well. First they are small countries, especially compared to the US, which, as it will be showed below, has attracted most of the attention in the literature. So one might wonder whether small countries, being more exposed to international competition, had a dissimilar profit rate dynamics than larger ones, especially regarding its link with structural change and income distribution. In the second place, these countries differ in terms of product market regulations (Høj et al., 2007), which might had a diverse impact on their economic performance, for instance hampering to various extents the reallocation of production inputs across economic sectors. A further difference among these countries is their system of welfare state, being it "conservative" in Italy and "social-democratic" in Finland and Denmark (Esping-Andersen, 1990). So it is possible to wonder whether different welfare systems produced dissimilar incentives to economic agents, leading to a different dynamics of capital profitability. Finally, Finland, in the last decade, underwent major structural changes and it recovered from a severe banking crisis in the early 1990s, which considerably affected the soundness of its public finances. So it might be an example for many advanced countries to exit the fiscal strains they had been subjected to after the 2008 crisis (IMF, 2009). Given the great diversity of

the countries we consider, our aim is to individuate common developments among them.

The rest of the paper is structured as follows. The next section reviews the relevant literature. Section 3 introduces the accounting framework, defines our variables and illustrates our data sources. Section 4 illustrates the dynamics of the aggregate profit rate and of its components both graphically and resorting to two popular decompositions. It further makes use of wage-profit curves to understand whether technological change was labour saving, capital saving, both labour and capital saving or it was labour saving and capital using. Section 5 explores how this dynamics was affected by structural change both in income distribution and technological development. Section 6 moves to consider the cyclical dynamics of the aggregate profit rate and of its components. The last section concludes, while the Appendix contains the calculations underlying our decompositions.

2 Literature Review

Being the nature of our contribution empirical, we will mention only briefly theoretical studies and we will give more space to applied works. We cover studies appeared after the mid 1970s. A comprehensive review of previous studies is offered in Shaikh and Tonak (1994).

The dynamics of the aggregate profit rate has been at the centre of a number of different theoretical papers, trying to understand whether, as ar-

gued by Karl Marx, aggregate profit rates have an inherent tendency to fall in capitalist economies. A first wave of studies, either directly or indirectly, questioned this tendency in general to exist (Okishio, 1961, Samuelson, 1971, Roemer, 1977, Wolff, 1979, Bowles, 1981), but some of their criticisms have been reassessed by more recent works (Shaikh, 1978, Foley, 1986, Michl, 1994, Thompson, 1995 and Laibman, 1996).

The empirical literature on the aggregate profit rate dynamics can be divided into two groups: the one concerning the US and the one regarding other countries. A tangential empirical literature is the one regarding wage-profit curves, which we will deal with at the end of this section, as we will resort to this tool to understand whether technological change had any specific bias against or in favour either labour or capital in the countries and time periods here considered.

We review the literature concerning the US following a chronological order with the exception of a digression regarding the issue of productive and unproductive labour.

Weisskopf (1979) tries to understand whether the decline in the US profit rate from 1949 to 1975 was due to a rising strength of labour, a rising organic composition of capital or to a realisation failure, as in principle these three mechanisms are not mutually exclusive. The empirical evidence there produced on the basis of national accounts data supports more the first explanation than the other two.

Wolff (1979) considers input-output data from 1947 to 1967 showing that

both the organic composition of capital and the rate of surplus value increased, but the latter more than the former one leading to an increase in the profit rate. On the other hand, in Wolff (1986) the profit rate turns out to have declined once analysing data from 1947 to 1976. Still, this decline was due more to a decrease in the rate of surplus value than to the increase in the organic composition of capital.

Hahnel and Shermnan (1982) investigates the behaviour of the profit rate over the business cycle, distinguishing between early expansion, late expansion and contraction. In early expansion, the profit rate rises because the profit share and, to a greater extent, capacity utilization increase. In late expansion, the profit rate falls because the profit share falls and capacity utilization remains more or less unaltered. Finally, in contraction, the profit rate declines due to a decline in capacity utilization.

Henley (1987) extends the analysis by Weisskopf (1979) to the period from 1949 to 1982 finding that the decline in capital profitability was due to a progressive deterioration from cycle to cycle in capacity utilization and that the increase in the labour share of income can be explained by the increasing expenditure in non-productive staff and in non-wage labour costs.

Michl (1988) concentrates on nonfinancial corporate profitability, highlighting, also by means of regression analysis regarding its trend structure, that its decline can be traced back to a decreasing profit share from 1948 to 1972 and to falling capital productivity from 1972 to 1986. Fichtenbaum (1988) stresses the role of changes in the turnover to understand the cyclical

dynamics of the profit rate in US manufacturing from 1949 to 1981.

Wolff (1979) and Wolff (1986) were followed by a debate showing that the extent of the rise in the organic composition of capital can depend on the distinction between productive and unproductive activities (Moseley, 1988, Wolff, 1988). Moseley (1990) also argues that the growing weight of unproductive activities can offer an alternative explanation for the decline of capital profitability after the second world war. On the basis of the distinction between productive and unproductive labour, Moseley (1985) also challenged the conclusions reached by Weisskopf (1979) arguing that the rate of surplus value actually increased and not decreased in the US from 1949 to 1975. However, Weisskopf (1985) replied that the shift from productive to unproductive labour could be explained by the rising bargaining strength of the former one against management.

Unfortunately, the distinction between productive and unproductive activities is somewhat problematic (see also Mohun, 2003). From an empirical point of view, there might often be lack of adequate data to appropriately distinguish the two kinds of labour. As a consequence, different articles tend to adopt different empirical definitions, hampering somewhat the comparability of the results. For instance, the definition adopted by Moseley (1985) for productive labour varies from sector to sector, being "production workers" in Mining, Manufacturing and Construction activities, "non-supervisory employees" in Transportation, Public Utilities and Service industries, "non-supervisory employees" divided by two in trade industries. In Shaikh and

Tonak (1994) productive labour is that employed in capitalist production sectors (agriculture, mining, construction, transportation and public utilities, manufacturing and all services except business services, legal services and private households). Also Mohun (2009), after offering a review of key contributions concerning the impact of the distinction between productive and unproductive labour on profit rate dynamics, follows a similar classification to the one adopted by Shaikh and Tonak (1994), though it implements a more detailed breakdown of productive and unproductive services. Wolff (1992) mentions one further empirical difficulty in implementing analyses distinguishing between productive and unproductive labour, namely that it is not clear how to assign circulating and fixed capital to each kind of activity. It is further argued there that an analysis not based on this distinction is legitimate as a similar rate of return is expected in both these kinds of activities. In the present contribution we do not have data on production workers, so we cannot distinguish between productive and unproductive labour within productive sectors. Therefore this line of research is not pursued here.

Duménil et al. (1987) analyse before-all-tax and after-all-tax profit rate time series from late nineteenth century to late twentieth century. They distinguish various sub-periods. Regarding the before-all-tax rate, downward forces were at work with the exception of the period during the second world war. Regarding the after-all-tax rate, a general decline was substituted by a flat plateau after the 1921 crisis, with an interruption during the 1929 depression. Duménil et al. (1993) focus on the US economy during the

second world war highlighting a sharp rise in the profit rate accompanied by a marked increase in total factor productivity.

Duménil and Levy (1990) show that using different accounting approaches does not alter the conclusion that the aggregate profit rate declined since the mid-sixties. Juillard (1992) reaches the same conclusion for the US economy from 1950 to 1987, distinguishing between sectors producing consumption goods and sectors producing capital goods. Wolff (1992) analyses input-output matrices from 1947 to 1977 and national accounts data for 1981, arguing that the fall in the profit rate was limited by a shift of employment from sectors with a high organic composition of capital to sectors with a low organic composition of capital.

According to Brenner (1998), instead, this fall was due to the intense international competition of US firms with German and Japanese ones. This conclusion was challenged by Zacharias (2002) comparing the movements of the profit rate of the manufacturing sector with that of the manufacturing trade balance. However, Brenner (2002) replied that the manufacturing trade balance cannot be considered as an indicator of competitiveness as it can be affected by aggregate demand. Instead, one should consider that the relative price of manufacturing goods and non-manufacturing goods markedly decreased between 1965 and 1973. Probably both the indicators are not as appropriate as the ratio of imports to total output to measure the exposure of an economy to international competition (Moreton, 1991).

Miller and Gowdy (1998) stress that, once taking into account produc-

tivity gains in capital production, the profit rate turns out to have declined to a much lesser extent than otherwise.

According to Duménil and Levy (2002) the aggregate profit rate declined after the second world war until the early eighties, when it started to rise. This trend is robust to the adoption of different profit measures (including or excluding inventories and payments for interests and taxes) and it gets more pronounced once excluding highly capital intensive industries. The early decline in the profit rate was due more to a fall in capital productivity than in the profit share. According to Moseley (1997) the recent rise of the profit rate was limited compared to its earlier fall due to the growth of unproductive labour. Also Wolff (2003), which is our main reference, captures the recent rise in US capital profitability tracing it back to an increase in the profit share in national income, a slowdown in the growth rate of the capital-labour ratio at the industry level and a shift towards more labour-intensive industries.

Bakir and Campbell (2006) extend the analysis by Weisskopf (1979) to 2001 showing that the fall in the profit share was still a leading factor of the profit rate, but also that, during the era of neolibearlism, this was not due to a real wage squeeze, but to the price of wage goods increasing much faster than that of other goods. Bakir and Campbell (2009) further consider data up to 2007. After Wolfson and Kots (2010), they interpret the evidence that the fall in the aggregate profit rate was a one step episode as a proof that a rising organic composition of capital cannot be the major driving force of the profit rate, which is rather determined by social structures of accumulation.

We now move to consider the literature on other countries than the US. We first review multi-country studies and afterwards single-country ones, on a country by country basis.

Poterba (1998) and Duménil and Levy (2001), considering various measures of the profit rate, show that its recent rise (from 1990 in the first work and from 1980 in the second one) was not confined to the US, but it extends to other G7 countries as well. Weisskopf (1988) concerns the G7 countries plus Sweden from 1955 to 1985. Results are highly heterogeneous across countries, but there are some commonalities too. First, during the seventies all the countries experienced a deterioration of profit rates due to both an increase in real wages and to a less favorable business environment. Such a deterioration was reversed in the 1980s in all the countries except Italy. Between the mid-1960s and the mid 1970s there was a distributional change in favour of labour in all the countries except West Germany and Sweden. Glyn (1991) considers data on the USA, Europe and Japan from 1960 to 1983, finding a fall in capital profitability –though some recovery showed up for the UK after 1983 - due both to a fall in the profit share and in the output capital ratio.

For Mexico, Ortiz (2005) shows that the aggregate profit rate declined from 1950 to 1975. From then to 2002 periods of booms were followed by periods of sharp declines. This pattern is robust to the adoption of different measures of profit rates. According to Izyumov (2005) profitability declined between 1994 and 1997 and rose from 1998 to 2002 in Russia, mainly as result

of changes in the output-capital ratio and not of the profit share of income. Maniatis (2005) offers a discussion of the empirical literature on profit rate trends in Greece (Papadimitriou, 1990; Ioakimoglou and Milios, 1993; Lianos, 1992; Tsaliki and Tsoulfidis, 1988; Tsaliki and Tsoulfidis, 1994) and it also finds empirical evidence in favour of the Marxian hypothesis of the tendency of the profit rate to fall. Regarding Spain, Izquierdo (2007) analyses data from 1954 to 2001 distinguishing in the time series of the profit rate a cyclical component due to changes in income distribution from a trend component due to the increasing organic composition of capital.

Torrini (2005) analyses Italian data from 1980 to 2003, finding that the profit rate declined by 10% in the manufacturing sector, but not in other economic sectors, where it remained stable. This difference can be traced back to reforms, redistributing income to different extents in different industries.

Glassman (2001) considers the case of Thailand, showing that the profit rate increased in the late 1980s due to higher capacity utilization and declined thereafter both for a decrease in the profit share and in capacity utilization. Lo (1999) documents a marked decline in profit rate in Chinese enterprises.

Freeman (1991) obtained similar results to Moseley (1985) for the UK from 1950 to 1985 once correcting the profit rate for taxes and unproductive labour, concluding that capital profitability declined due to the rising organic composition of capital. Unproductive labour was, not un-controversially, defined as labour employed in the banking and retail sectors. According to Funke (1986), annual data for the UK manufacturing sector from 1951 to

1981 show a marked decline in capital profitability due to decreasing capital utilization and productivity as well as to faster price increases for investment goods than for manufacturing output. Henley (1989) applies the approach by Weisskopf (1979) to UK quarterly data showing a five per cent per annum fall in the net profit rate due to declines in the profit share, in capital productivity and in capacity utilization. He also finds that capital profitability anticipates the economic cycle as a result of changes in income distribution. Moreton (1991) resorts to regression analysis to study the correlation of the profit rate with various economic variables on UK data from 1957 to 1985. His findings are that the ratio of gross profits over net capital stock is negatively correlated with unemployment (a measure of "the reserve army of labour"), the tax rate and the import/output ratio (a measure of exposure to international competition). Cockshott et al. (1995) collect UK data from 1855 to 1938 and from 1949 to 1989. They distinguish between productive and un-productive sectors, the former ones being Agriculture, Forestry and Fishing; Mining and Quarrying; Manufacturing; Construction; Gas, Electricity and Water; Transport and Communications. Their findings differ in different time periods. From 1855 to 1938 the organic composition of capital was falling and the profit rate rising. From 1949 to 1979 the contrary happened, while from 1979 to 1989 capital profitability was restored mainly thanks to a decline in the labour share of income. Maniatis (1996) criticizes this study as it does not fully conform to the method proposed by Shaikh and Tonak (1994).

A tangential stream of literature is the one concerning wage-profit curves, which are a tool to study whether technical change results in an enhancement of capital productivity, of labour productivity, of both or in an increase in labour productivity and a reduction of capital productivity. In this last case, technical change is said to have a Marxian bias. Ochoa (1989) derives these curves from input-output tables for the US economy from 1947 to 1972. The profit rate was found to be roughly stable around 20%.

Michl (1991) focuses on US manufacturing from 1948 to 1987, introducing the concept of tautological wage-profit curves, derived from the national accounting identity equating total income to the sum of wages and profits. With a few algebraic manipulations, one can rewrite this identity as

$$w = \frac{y}{n} - r' \frac{k}{n} \tag{1}$$

where w is the average real wage, n is the number of workers, r' is the profit rate depurated from the relative dynamics of the general level of prices and of the prices of capital goods (it is deflated by the GDP deflator and inflated by capital deflator), k is the real net capital stock and y is real income. Geometrically, this equation is a line in the space (r',w) having as intercepts, on the vertical axis, $\frac{y}{n}$ and, on the horizontal axis, $\frac{y}{k}$ (which is the maximum rate of profit) and as slope the capital-labour ratio. Technological progress will be labour saving if labour productivity increases and capital saving if capital productivity increases. According to Michl (1991) technological progress

had a Marxian bias in some periods between 1948 and 1987. Mixed evidence regarding a Marxian bias in technical change was found also in Marquetti (2003) once analysing data for various countries from the Penn World Tables from 1964 to 1990. Ferretti (2008) explores the patterns of technical change experienced by a set of 18 industrialized economies from 1961 to 2005 and in the Italian manufacturing sector from 1951 to 2003. The evolution of technical change is found to be uneven, but a Marxian bias prevails during periods of slow output growth. In Italian manufacturing the profit rate was declining.

3 Accounting framework, definition of variables and data sources

Our data sources are the STAN OECD database and the national accounts of the countries considered. From the former one, we take the following variables: gross output in current prices (PROD), gross output deflator (PRDP), labour costs (LABR), the number of persons engaged in production (EMPN), the number of employees (EMPE), the gross operating surplus and mixed income (GOPS), the net operating surplus and mixed income (NOPS). From the latter ones, we take the net and gross stocks of capital at current replacement cost (respectively NETK and GROSSK) and their deflated counterparts (NETKR and GROSSKR).

After Wolff (2003), we focus on the private sector and we correct NOPS

and GOPS for the income of the self-employed as follows:

$$GOPS\prime = GOPS - (LABR/EMPE) * (EMPN - EMPE)$$

$$NOPS\prime = NOPS - (LABR/EMPE) * (EMPN - EMPE)$$

NOPS'and GOPS'are our two measures of total profits (π).

As a matter of consequence the total wage bill (wn), the national net and gross incomes (respectively NNI and GNI) are computed as

$$wn = LABR + (LABR/EMPE) * (EMPN - EMPE)$$

$$GNI = GOPS\prime + wn$$

$$NNI = NOPS\prime + wn$$

Aggregate variables were computed as sums of sectoral ones.

Our analysis concerns the following sectors: Agriculture, Hunting, Forestry and Fishing; Mining and Quarrying; Food products, beverages and tobacco; Textiles, textile products, leather and footwear; Wood and products of wood

and cork; Pulp, paper, paper products, printing and publishing; Chemical, rubber, plastics and fuel products; Other non-metallic mineral products; Basic metals and fabricated metal products; Machinery and equipment; Transport equipment; Manufacturing n.e.c.; Electricity, Gas and Water supply; Construction; Wholesale and Retail Trade, Restaurants and Hotels; Transport, Storage and Communication; Finance, Insurance, Real Estate and Business Services. The level of aggregation, very similar to that adopted in Wolff (2003), is dictated by the necessity of merging the data produced by the OECD with those produced by national statistical offi ces.

4 Long-run trends in aggregate profit rates

Figure 1 shows the trends in the net and in the gross profit rates for Italy, Denmark and Finland. We consider both gross and net profit rates –computed as GOPS/GROSSK and NOPS/NETK - because, after Wolff (2003), we want to check that capital depreciation did not have so marked an impact on profits and capital to change the overall trend of profit rates. All in all, the series tend to move together, having a correlation of 0.93 in Denmark, 0.995 in Finland and 0.998 in Italy.

For Denmark no specific trend can be detected. From 1970 to 2006 the net and gross profit rates moved up and down around respectively 4.5% and 5.5%. In Italy and Finland two phases are discernible more or less coinciding with those of the economic cycle. In the former country, profit rates declined in

the first half of the 1980s, 1990s and from 2002 to 2007, while they increased in the second half of the 1980s and the 1990s. In Finland, profit rates were stable in the 1980s, dipping in the early 1990s. They were subsequently characterized by an increasing trend until 2001. Afterwards net profit rate stabilized around 9% and gross profit rate around 8%.

The movements of profit shares of income - computed as GOPS/GNI and NOPS/NNI - mirrored those of profit rates as showed in Figure 2, but, while for Finland and Italy, profit shares were much higher at the end of the period of observation, in Denmark they were more stable. Given that net and gross profit rates (shares) do not show to move differently, we will only focus on the former ones in the rest of the paper.

In order to shed further light on the dynamics of the aggregate net profit rate we will make use of two popular decompositions. In the first one, the developments of the profit rate are the result of those of the profit share and of the inverses of the capital-income ratio in real terms and of the price of capital goods relative to the average price level (here represented by PRDP, hereafter referred to as GDP deflator):

$$r = \frac{\pi}{p_k K} = \frac{\pi}{p_k y} \frac{p_y}{p_k} \frac{y}{k} \tag{2}$$

where p_y is the inverse of the GDP deflator, p_k is the inverse of the capital price deflator (NETK/NETKR), y is real income (NNI) and k is the real capital stock (NETKR).

In all the three countries considered, capital goods became relatively more expensive during the period of observation as $\frac{p_y}{p_k}$ trended downwards, with the exception of the early 1990s in Italy and Finland when it experimented a temporary hike (Figure 3). The capital-income ratio, both in real and in nominal terms, was stable in Denmark. In Finland it was stable until the mid-eighties, increasing until the early 1990s and declining thereafter. In Italy, instead it was declining until the late 1980s, increasing until the mid 1990s, stable until 2001, when it started to increase sharply. All in all, it is possible to state that income per unit of capital and the profit share tended to contribute in a similar way to changes in profit rates, meaning that when income per unit of capital was increasing (decreasing) also a greater (smaller) fraction of this income was accruing to profits.

The second decomposition we consider is the following

$$r = \frac{\pi}{p_k k} = \frac{\pi}{wn}\frac{wn}{p_k k} = \frac{\epsilon}{\theta} \tag{3}$$

where ϵ is the ratio of total profits to total workers'compensation and θ is the organic composition of capital –the ratio of nominal capital and the total wage bill. ϵ and θ can be further decomposed as follows:

$$\epsilon = \frac{\pi}{wn} = \frac{p_y y}{wn} - 1 = \frac{\left(\frac{y}{n}\right)}{\left[\left(\frac{w}{p_c}\right)\left(\frac{p_c}{p_y}\right)\right]} - 1 \tag{4}$$

$$\theta = \left(\frac{k}{n}\right)\left(\frac{p_k}{w}\right) \tag{5}$$

where y/n is labour productivity, p_c is the consumer price index (CPI), w/p_c is the average nominal wage deflated by CPI, p_c/p_y is the ratio of the CPI to the inverse of the GDP deflator, k/n is the capital-labour ratio and p_k/w is the relative unit cost of capital and labour.

The picture emerging from Figure 4 is rather clear-cut. Labour productivity markedly outstripped labour average real compensation, more than offsetting the rise in the CPI/GDP deflator ratio given that comparing the last year of observation to the first one ϵ increased by 7% in Denmark, by 386% in Finland and by 25% in Italy. However, as showed by Figure 5, only in Finland this trend was not offset by a rise in θ. In Italy and in Denmark, the organic composition of capital increased because of an upward trend in the capital-labour ratio, not compensated by the decline in p_k/w. In Finland, instead, the increase in k/n came to a halt in the early 1990s and θ started to decline.

A peculiarity to stress is that in Italy, more than in the other countries, the profits/wages ratio and the organic composition of capital tended to offset each other, notwithstanding that the former one was in general moving in the opposite direction than the relative unit cost of production inputs. This is because at the time when profits were increasing compared to the total wage bill, the economy was shifting to more capital intensive techniques as

well.

To further investigate the sources of the dynamics of net profit rates of the countries considered, we follow Wolff (2003) and we decompose the percentage changes of the profit rates, first, into the percentage changes of the income-capital ratio, of the profit share and of the relative GDP-capital deflator, and, then, into those of the profits/wages ratio and of the organic composition of capital. Detailed calculations are presented in the Appendix, but in general we rely on the fact that if $y = ab$, then $y_{t=2} - y_{t=1} = a^*(b_{t=2} - b_{t=1}) + b^*(a_{t=2} - a_{t=1})$, where t is time and starred variables are time averages. In so doing, we consider not only overall percentage changes, but we also try to isolate long-run developments from cyclical effects, by selecting years slightly below the peak of the business cycle - once defining recession years those with at least 2 quarters with negative GDP growth[2].

Results are set out in Tables 1a-c. In Finland the re-distribution of income from labour to capital was by large the most important driver of the net profit rate. On the other hand, in Denmark this did not happen in the 1970s, while in the 1980s income was distributed from capital to labour so that the roles of the profit share and of the profits/wages ratio in driving the profit rate were overall more muted than in Finland. In Italy, the profit share and the profits/wages ratio had a minor weight in the eighties, a major one in the nineties and they had more or less the same weight of technological developments from 2003 to 2006 and in the whole of the period considered.

[2]GDP series were taken from the IMF-IFS database.

All in all the relative importance of income distribution and technological developments varies from country to country and from time period to time period. However, a general pattern emerges once focusing on the overall period considered.

1st general pattern*: in countries without a substantial re-distribution of income in favour of profits, the profit rate declined.*

Building on (4), Table 2 shows that such redistribution took place due to the profits/wages ratio increasing substantially during the period of observation thanks to labour productivity growth outstripping the growth rate of the real wage. This holds true also for the subperiods considered with the exception of the years from 1970 to 1989 in Denmark and from 2003 to 2006 in Italy, which leads us to a second general pattern.

2nd general pattern: *when labour productivity is weak the profits/wages ratio declines leading also to a decline in the profit rate.*

A third general pattern can be highlighted on the basis of (5), by decomposing the dynamics of the organic composition into the effects of the growth of the capital-labour ratio and of the change of the price of capital goods relative to the average nominal wage (Table 3). Though this two effects have opposite signs, the increase in the capital intensity of production processes prevailed leading to an increase in the organic composition of capital with the exception of Finland from 1990 to 2007.

3rd general pattern: *developments in the capital-labour ratio tend to*

increase the organic composition of capital while those in the ratio between the capital price deflator and the average wage tend to decrease it. The former effect tends to prevail over the latter one.

Table 4 summarizes the results set out in Tables 2 and 3 distinguishing between a technological effect - further decomposed into the changes in labour productivity, in the capital-labour ratio and in the relative price of production inputs – and a real wage effect. During the period of observation, the net profit rate declined in Denmark and Italy and substantially increased in Finland. However net profit rates increased form 1990 to 2006 in Denmark and from 1992 to 2002 in Italy. In general the profit rate declined when productivity growth and the positive effect deriving from relative input prices did not manage to outstrip the negative effects of capital deepening and increasing average real wage. The only exception to this pattern shows up in Italy from 2003 to 2006, when the decline in the profit rate took place mainly due to a decline in labour productivity and due to a negative effect stemming from the dynamics of the price of capital goods relative to the average wage. This, together with Figures 4 and 5, leads us to highlight a fourth general tendency.

4th general pattern: *when productivity growth is weak or negative and the capital deflator/nominal wage ratio does not decline enough, the profit rate declines also due to capital deepening.*

The remainder of this section makes use of wage-profit curves to under-

stand whether technological progress had any Marxian bias. Once inspecting wage-profit curves like (1) it is not possible to have an immediate idea of the dynamics of income distribution. A rise in the average real wage is not immediately informative on changes in the labour share of income given that the average productivity might have outpaced it.

In order to better highlight the distributional information contained in wage-profit curves, we normalize them with labour productivity at time zero, so that their vertical intercept will be labour productivity at time t as a proportion of labour productivity at the first year of observation. Wage-profit curves will still cross the horizontal axis at the value of the output-capital ratio. Similarly, the actual real wage will be expressed as a proportion of average labour productivity at the first year of observation.

Technical change displayed different patterns across countries and time periods. Regarding Italy, it was both labour and capital saving between 1980 and 1992, but it displayed a Marxian bias between 1992 and 2003. In Finland, technical change was labour saving from 1975 to 1990 and both labour and capital saving between 1990 and 2007, while in Denmark it had a Marxian bias between 1970 and 1980 and, afterwards, it was both labour and capital saving. It is confirmed that in all the countries considered real average wages were increasing but less than average labour productivity, with the exception of Italy, where they were roughly constant from 1992 to 2003. Also $r\prime$ was increasing, with the exception of Denmark, where in 2003 it did not have completely recovered its fall during the 1970s. In Italy, the increase in $r\prime$ did

not translate into an increase in r (Table 1c). Focusing on the overall period considered and keeping in mind Table 1c, it is possible to reach the following conclusion.

5th general pattern: *falls in the profit rate took place in countries with weaker technological change with episodes of Marxian bias.*

We now move to consider the impact of sectoral change on the profit rate. For sake of brevity, we consider only decomposition (4) following Wolff (2003).

5 Sectoral decompositions

Once implementing sectoral decompositions of profit rates, Wolff (2003) argues that in the long-run competition will drive sectoral ϵs towards a unique value. If this is true, the sectoral deviations from the average value of ϵ should be stationary. Before adopting this hypothesis, we use various panel unit root tests to verify whether there is any empirical support for it. Specifically, we adopt tests that do not impose that the speed of convergence of sectoral deviations from the average ϵ is the same across all sectors like the Im et al. (2003) test and the Augmented Dickey Fueller and the Phillips and Perron tests proposed by Maddala and Wu (1999) and Choi (2001). An introduction to these tests is not provided here, but it can be found in Baltagi (2001). We conducted the tests both with and without a time trend in the model. The null hypothesis of all the tests is the presence of a unit root in all

the time series under analysis, while the alternative is that some time series do not have a unit root.

The fact that the deviation from the mean of profit rate series are not stationary, means that they permanently incorporate shocks not displaying mean reversion. Therefore, it is enough for one series to have a unit root to reject the hypothesis that sectoral ϵs tend to collapse towards a unique value. As showed in Table 5, for Denmark and Italy all the time series considered appear to be non-stationary, while for Finland the time series of most sectors are so. We conclude that, at least for our sample, it is not advisable to impose the equality of sectoral ϵs, once decomposing the aggregate profit rate into its industrial components. Appendix B shows our calculations, which do not impose this restriction.

The impact of sectoral developments on aggregate variables is analysed in Tables 6 to 8. Tables 6 and 7 show markedly different results than those produced by Wolff (2003). In Denmark and Finland, aggregate capital deepening happened not only because the various economic sectors considered were adopting more capital intensive techniques but also because employment was moving from less to more capital intensive sectors. In Italy, instead, this is true for the period from 2003 to 2006. For previous sub-periods and also considering the whole period from 1980 to 2006, economic sectors were on average adopting less capital intensive techniques, but this was offset by employment shifting from less capital intensive to more capital intensive industries.

6th general pattern: *employment shifts from low to high capital intensity sectors are a major factor behind the rise of aggregate capital intensity even when sectoral capital stocks per worker decline.*

Regarding the organic composition, sectoral development would actually make it fall, if it was not for the increasing weight of sectors with a high organic composition of capital in the total wage bill of the economies considered. It is possible to find exceptions to this general pattern in Finland from 1975 to 1989 and in Italy from 1992 to 2003, when both the change in sectoral organic compositions and wage bill shares led to an increase in the aggregate organic composition.

The results emerged in Table 7 regarding the organic composition of capital are mirrored by those concerning the aggregate net profit rate set out in Table 8. With the exceptions mentioned above, sectoral development in the organic composition of capital would actually benefit the profit rate, if it was not for the increasing weight of sectors with a high organic composition of capital in the total wage bill, which was mainly due to employment moving from low to high organic composition industries and only to a lesser extent to wage increases taking place in the latter more than in the former ones. Table 8 also shows that the profit rate was depressed by sectoral increases in the real wage, but supported by increases in sectoral labour productivity and by employment shifting from less to more productive sectors.

7th general pattern: *employment shifted from low to high organic composition industries depressing the aggregate profit rate even in presence of*

decreasing sectoral organic compositions.

8th general pattern: *employment shifted from low to high productivity sectors boosting the aggregate profit rate by more than offsetting the negative impact of real wages.*

Our interpretation of the results concerning the organic composition of capital is supported by regression analysis (Table 9). We estimate three models. In the first one, we have as dependent variable the percentage change of employment over the whole period of observation and as explanatory variable the initial level of organic composition of capital. In the second one, we have as dependent variable the percentage change of the organic composition and as explanatory variable the percentage change of employment. Finally, in the third one, we have as dependent variable the percentage change in the organic composition and as independent variable its initial level. All variables are in logarithms, so our coeffi cients are elasticities. The unit of observations are sectors and the dataset has two dimensions being cross-sector and cross-country. As a consequence, after Baltagi (2001, pp. 31-50) we use a two-way error component model. We implement a within estimator and various feasible generalized least squares random effects estimators, namely those proposed by Wallace and Hussain, Amemya and Nerlove. We also run a Hausman test to detect whether the within or the Nerlove random effect estimator better suits our data. It turns out that the random effects estimators are those to be preferred, but results are very similar across different models. A sector having a 1% higher organic composition of capital at the beginning

of the period of observation experienced a 0.22% higher employment growth. This very employment growth, however, was causing a smaller growth in the organic composition of capital of a given sector with an elasticity of about 0.3, but not to an extent to make sectoral organic compositions to converge given that, regressing their growth rate on their initial level, coeffi cient estimates are not significantly different from zero.

6 Cyclical dynamics of aggregate profit rates and their components

The present section is devoted to the analysis of the cyclical behaviour of the profit rates and its components, namely the net profit share, net income over the net capital stock, net profits over total wages and total wages over the capital stock. Under a methodological point of view we follow, for instance, Agénor et al. (2000), by first de-trending our time series and then studying the correlation of their de-trended part as well as of its first and second lags and leads with the de-trended portion of the aggregate time-series of real output computed from PROD and PRDP. We use both the Hodrick-Prescott and the Band Pass filter, as it is well known that different detrending techniques can produce different results (Canova, 1998). We adapt the former one to annual data following Ravn and Uhlig (2001). Regarding the latter one we adopt the version proposed by Baxter and King (1999).

The degree of co-movement of a given series with real output is mea-

sured by the magnitude of the correlation coeffi cient$\Delta(j)$, $j \in \{0, \pm 1, \pm 2\}$. A series is considered to be procyclical, acyclical, or countercyclical if the contemporaneous correlation coeffi cient,$\Delta(0)$, is positive, zero, or negative, respectively. In addition, we argue that a given series leads the cycle by j periods if $|\Delta(j)|$ reaches its maximum for a positive j, is synchronous with the cycle if $|\Delta(j)|$ reaches its maximum for $j = 0$, and lags the cycle if $|\Delta(j)|$ is a maximum for a negative j.

Notwithstanding some lack of robustness inherent in detrending techniques, some general patterns emerge in our results as showed by Table 10. All variables are procyclical, being their contemporaneous correlation with de-trended real output positive and significant, with the exception of the inverse of the organic composition in Italy and Finland. As a consequence, it seems that the business cycle dynamics of the profit rate can be explained by (either defensive or offensive) rising strength of labour and by realization failures in these two countries, while rising organic composition had also a role in Denmark.

9th general pattern: *rising strength of labour and realization failures tend to have a greater role than rising organic composition in cyclical profit rate dynamics*

Consistently with the findings by Hahnel and Sherman (1982), the profit rate tends to anticipate the cycle and future profits are high when output is low and low when current output is high. This means that during a recession, for instance, future profits are high given that the economy will recover in

the future. This is mainly so because of a similar behaviour of distribution variables, like the profit share and the profits/wages ratio. On the other hand, the income-capital ratio (which, being here de-trended, could be considered a proxy for capacity utilization) tends to be synchronous to the economic cycle and the proportion of variable capital to fixed capital tends to be rather resilient to output movements. Only in Denmark it follows the cycle more closely. This leads us to highlight one further general pattern

10th general pattern: *rising strength of labour, realization failures and rising organic composition are three mechanisms that tend to take place at different times over the business cycle. The first mechanism is also the first one to show up, while the second and the third ones tend to follow it.*

7 Conclusions

In this paper we have analysed the connection between technological development, income distribution, structural change and profit rate dynamics in Denmark, Finland and Italy over about three decades. Notwithstanding the broad differences characterizing these countries, we have highlighted ten general patterns. Our results can be summarized as follows.

Regarding the long-run, preconditions for the profit rate not to decline are a redistribution of income from labour to capital and strong productivity growth. In countries where technological change is weak, it also tends to show episodes of Marxian bias. Regarding the organic composition of capital, it

is increased by changes in the capital-labour ratio and decreased by those in the ratio of the price of capital over the average wage, as the latter tends to grow faster than the former. Structural change was a major driver of the aggregate profit rate, as the weight of capital intensive and high organic composition sectors as well as of those with high productivity increased.

Regarding the short run, profit rate dynamics is driven more by rising strength of labour and realization failures than by increasing organic composition. Over the cycle, the first mechanism is also the first one to show up, while the second and the third ones appear at later stages.

All our results are consistent with previous findings in the literature, especially those concerning the US contained in Wolff (2003), with the exception of those concerning structural change. In this case, we highlighted the role of employment shifts towards more productive sectors, which could not be found by Wolff (2003) due to his restriction of industrial profit/wages ratios to be equal. Regarding our findings about capital intensity and organic composition, they are exactly the opposite of those in Wolff (2003). While in the US employment tended to concentrate in more labour intensive sectors, boosting the aggregate profit rate and lowering the organic composition of capital, in the countries we considered the weight of capital intensive sectors in total employment and in the total wage bill increased, with opposite effects on the aggregate profit rate and organic composition.

Wolff (2003) lists a number of possible explanations for his findings. First, new lines of production usually start with low capital intensity, experiencing a

growth in the capital-labour ratio over time. Secondly, the expansion of firms in capital intensive sectors might be hampered by capital shortages due to a low investment rate. In the third place, changing power relations in favour of capital and against labour, together with product market regulations and - after Duménil and Levy (2001) - changes in monetary policy, might restrain real wages and depress the labour share of income, rendering production in labour intensive sectors cheaper.

The countries we analysed allow us to rule out the latter two explanations. Declines in the investment share of output affected to a similar extent the US and Denmark and to a greater extent Finland and Italy (see, for instance, Pelgrin et al., 2001, Table 1). Furthermore, in the three countries analysed in the present study structural change had the same direction notwithstanding that the profit share was increasing in Finland and Italy and stable in Denmark.

We are left with the explanation regarding the new lines of production. However, it is necessary to explain why in the US new lines of production concentrated more in labour intensive sectors than in capital intensive ones, while in Finland, Denmark and Italy the opposite happened. Looking at Figure 5 it is possible to argue that the three European countries here analysed were specializing in the sectors using more intensively the production factor that was getting relatively cheaper. The US, instead, though experiencing a similar trend in $\frac{p_k}{w}$ to the other countries (see Wolff, 2003, Figure 6), specialized in those sectors using more intensively the production factor that was

getting more relatively expensive.

It is tempting to explain this specificity of the US as a change in consumers'preferences in a relatively closed economy. The change in preferences towards labour intensive sectors can be connected to the "marketization" hypothesis, which explains the greater specialization of the US economy in service industries on the basis of higher female labor force participation (Freeman and Schettkat, 2001, 2005). Women, increasing their market work hours, led to a substitution of household production for market products (marketization), which raised aggregate demand in the US economy and affected demand for services especially.

This process was not hampered in the US by an attempt to exploit comparative advantages. Indeed, regarding the exposure to international trade, it is worth recalling that, according to the Penn World Tables, the ratio of the sum of imports and exports over GDP in current prices was about 60% in Denmark in 1970 and it reached 103% in 2007. In Italy these figures were 31.3% and 58.7% and in Finland 50.4% and 84.4%. In the US, instead, they were 11.27% and 29.07%.

Our study also carries theoretical and policy implications. In the first place, given our results, economic models incorporating structural change should be adopted once trying to explain aggregate profit rate dynamics. In the second place, the case of Finland is illustrative of a possible way out for advanced economies from the recent financial and economic crisis. Rebuilding long-run capital profitability requires to hasten the pace of labour productiv-

ity growth and technological progress together with labour reallocation from less to more productive economic sectors. However, under capitalism, it will also entail that the consequent benefits will accrue more to capital than to labour, increasing the profits/wages ratio, which, after Weisskopf (1979), is nothing more than the price analogue of the Marxian rate of exploitation.

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8 Appendices

A Aggregate decompositions

A.1 Decomposition showed in Tables 1a-c

After (3) one can write

$$r = \frac{\pi}{p_k k} = (\pi/wn) / (p_k k/wn) = \epsilon/\theta = \epsilon\gamma \tag{6}$$

where $\gamma = \frac{1}{\theta}$. As a consequence

$$\frac{r_2 - r_1}{r_1} = \frac{\gamma^* (\epsilon_2 - \epsilon_1)}{\gamma_1 \epsilon_1} + \frac{\epsilon^* (\gamma_2 - \gamma_1)}{\gamma_1 \epsilon_1} \tag{7}$$

where $x^* = \frac{x_2 + x_1}{2}$, with x being any of the asterisk variables in (7).

One can also write r as

$$r = \frac{\pi}{p_k k} = \frac{\pi}{p_y y} \frac{p_y}{p_k} \frac{y}{k} \tag{8}$$

So that

$$\frac{r_2 - r_1}{r_1} = \frac{\frac{\pi}{p_y y}\Big|^* \frac{p_y}{p_k}\Big|^* \left(\frac{y}{k}\Big|_2 - \frac{y}{k}\Big|_1\right)}{\frac{\pi}{p_y y}\Big|_1 \frac{p_y}{p_k}\Big|_1 \frac{y}{k}\Big|_1} + \frac{\frac{p_y}{p_k}\frac{y}{k}\Big|^* \left(\frac{\pi}{p_y y}\Big|_2 - \frac{\pi}{p_y y}\Big|_1\right)}{\frac{\pi}{p_y y}\Big|_1 \frac{p_y}{p_k}\Big|_1 \frac{y}{k}\Big|_1} + \frac{\frac{\pi}{p_y y}\Big|^* \frac{y}{k}\Big|^* \left(\frac{p_y}{p_k}\Big|_2 - \frac{p_y}{p_k}\Big|_1\right)}{\frac{\pi}{p_y y}\Big|_1 \frac{p_y}{p_k}\Big|_1 \frac{y}{k}\Big|_1}$$

A.2 Decomposition showed in Table 2

Consider that

$$\epsilon = \frac{\pi}{wn} = \frac{p_y y}{wn} - 1 \tag{9}$$

Similarly to above one can write

$$\begin{aligned} \frac{(\epsilon_2 - \epsilon_1)}{\epsilon_1} &= \frac{\frac{p_y}{w}\Big|_2 \frac{y}{n}\Big|_2 - \frac{p_y}{w}\Big|_1 \frac{y}{n}\Big|_1}{\frac{p_y}{w}\Big|_1 \frac{y}{n}\Big|_1 - 1} = & (10) \\ &= \frac{\frac{p_y}{w}\Big|^* \left(\frac{y}{n}\Big|_2 - \frac{y}{n}\Big|_1\right)}{\frac{p_y}{w}\Big|_1 \frac{y}{n}\Big|_1 - 1} + \frac{\frac{y}{n}\Big|^* \left(\frac{p_y}{w}\Big|_2 - \frac{p_y}{w}\Big|_1\right)}{\frac{p_y}{w}\Big|_1 \frac{y}{n}\Big|_1 - 1} & (11) \end{aligned}$$

where $x^* = \frac{x_2 + x_1}{2}$, with x being any of the asterisk variables in (10).

A.3 Decomposition showed in Table 3

We define here the organic composition of capital as

$$\theta = \frac{p_k k}{wn} = (k/n)\,(p_k/w) = (p_k/w)\,\tau$$

where τ is the capital-labour ratio.

One can write

$$\frac{\theta_2 - \theta_1}{\theta_1} = \frac{\frac{p_k}{w}\Big|^* (\tau_2 - \tau_1)}{\frac{p_k}{w}\Big|_1 \tau_1} + \frac{\tau^* \left(\frac{p_k}{w}\Big|_2 - \frac{p_k}{w}\Big|_1\right)}{\frac{p_k}{w}\Big|_1 \tau_1} \tag{12}$$

where $x^* = \frac{x_2 + x_1}{2}$, with x being any of the asterisk variables in (12).

A.4 Decomposition showed in Table 4

Combining equations (6) and (9), it is possible to obtain

$$r = \frac{\pi}{p_k k} = (\pi/wn) / (p_k k/wn) = \frac{\frac{p_y}{w}\frac{y}{n} - 1}{\left(\frac{p_k}{w}\frac{k}{n}\right)} \tag{13}$$

To decompose (13), we substitute (11) in (7) to obtain

$$\frac{r_2 - r_1}{r_1} = \frac{\gamma^*}{\gamma_1}\left[\frac{\frac{p_y}{w}\Big|^*\left(\frac{y}{n}\Big|_2 - \frac{y}{n}\Big|_1\right)}{\frac{p_y}{w}\Big|_1 \frac{y}{n}\Big|_1 - 1} + \frac{\frac{y}{n}\Big|^*\left(\frac{p_y}{w}\Big|_2 - \frac{p_y}{w}\Big|_1\right)}{\frac{p_y}{w}\Big|_1 \frac{y}{n}\Big|_1 - 1}\right] + \frac{\epsilon^*(\gamma_2 - \gamma_1)}{\gamma_1 \epsilon_1} \tag{14}$$

In (7) consider that

$$\frac{(\gamma_2 - \gamma_1)}{\gamma_1} = \frac{\frac{1}{\theta_2} - \frac{1}{\theta_1}}{\frac{1}{\theta_1}} = \frac{\theta_1}{\theta_2} - \frac{\theta_1}{\theta_1} = \frac{\theta_1}{\theta_2} - 1 = \frac{\theta_1 - \theta_2}{\theta_2} = \left(-\frac{\theta_1}{\theta_2}\right)\left(\frac{\theta_2 - \theta_1}{\theta_1}\right) \tag{15}$$

Substituting (15) in (14) one can obtain

$$\begin{aligned}\frac{r_2 - r_1}{r_1} &= \frac{\gamma^*}{\gamma_1}\left[\frac{\frac{p_y}{w}\Big|^*\left(\frac{y}{n}\Big|_2 - \frac{y}{n}\Big|_1\right)}{\frac{p_y}{w}\Big|_1 \frac{y}{n}\Big|_1 - 1} + \frac{\frac{y}{n}\Big|^*\left(\frac{p_y}{w}\Big|_2 - \frac{p_y}{w}\Big|_1\right)}{\frac{p_y}{w}\Big|_1 \frac{y}{n}\Big|_1 - 1}\right] + \\ &+ \frac{\epsilon^*}{\epsilon_1}\left(-\frac{\theta_1}{\theta_2}\right)\left(\frac{\theta_2 - \theta_1}{\theta_1}\right)\end{aligned} \tag{16}$$

and substituting (12) in (16) we get

$$\begin{aligned}\frac{r_2 - r_1}{r_1} &= \frac{\gamma^*}{\gamma_1}\left[\frac{\frac{p_y}{w}\Big|^*\left(\frac{y}{n}\Big|_2 - \frac{y}{n}\Big|_1\right)}{\frac{p_y}{w}\Big|_1 \frac{y}{n}\Big|_1 - 1} + \frac{\frac{y}{n}\Big|^*\left(\frac{p_y}{w}\Big|_2 - \frac{p_y}{w}\Big|_1\right)}{\frac{p_y}{w}\Big|_1 \frac{y}{n}\Big|_1 - 1}\right] + \\ &+ \frac{\epsilon^*}{\epsilon_1}\left(-\frac{\theta_1}{\theta_2}\right)\left[\frac{\frac{p_k}{w}\Big|^*(\tau_2 - \tau_1)}{\frac{p_k}{w}\Big|_1 \tau_1} + \frac{\tau^*\left(\frac{p_k}{w}\Big|_2 - \frac{p_k}{w}\Big|_1\right)}{\frac{p_k}{w}\Big|_1 \tau_1}\right]\end{aligned} \tag{17}$$

B Sectoral decompositions

B.1 Decomposition showed in Table 6

Considering that $\tau = \frac{k}{n} = \frac{\sum_j k_j}{n} = \sum_j \frac{n_j}{n}\frac{k_j}{n_j}$, one can compute

$$\frac{\tau_2 - \tau_1}{\tau_1} = \sum_j \frac{\mathbf{s}_j^* \left(\tau_{2,j} - \tau_{1,j}\right)}{\sum_j \mathbf{s}_{1,j}\tau_{j,1}} + \sum_j \frac{\tau_j^* \left(\mathbf{s}_{2,j} - \mathbf{s}_{1,j}\right)}{\sum_j \mathbf{s}_{1,j}\tau_{j,1}} \tag{18}$$

where $x^* = \frac{x_2+x_1}{2}$, with x being any of the asterisk variables in (18) , and $\mathbf{s}$ are sectoral employment shares ($\mathbf{s}_j = \frac{n_j}{n}$).

B.2 Decomposition showed in Table 7

On the basis of $\theta = \frac{p_k k}{wn} = \frac{\sum_j p_{k,j} k_j}{wn} = \sum_j \frac{w_j n_j}{wn}\frac{p_{k,j}k_j}{w_j n_j}$, one can write

$$\frac{\theta_2 - \theta_1}{\theta_1} = \sum_j \frac{s_j^* \left(\theta_{2,j} - \theta_{1,j}\right)}{\sum_j s_{1,j}\theta_{1,j}} + \sum_j \frac{\theta_j^* \left(s_{2,j} - s_{1,j}\right)}{\sum_j s_{1,j}\theta_{1,j}} \tag{19}$$

where $x^* = \frac{x_2+x_1}{2}$, with x being any of the asterisk variables in (19) , and s are sectoral wage-bill shares ($s_j = \frac{w_j n_j}{wn}$).

B.3 Decomposition showed in Table 8

In (7) consider that

$$\frac{(\gamma_2 - \gamma_1)}{\gamma_1} = \frac{\frac{1}{\theta_2} - \frac{1}{\theta_1}}{\frac{1}{\theta_1}} = \frac{\theta_1}{\theta_2} - \frac{\theta_1}{\theta_1} = \frac{\theta_1}{\theta_2} - 1 = \frac{\theta_1 - \theta_2}{\theta_2} = \left(-\frac{\theta_1}{\theta_2}\right)\left(\frac{\theta_2 - \theta_1}{\theta_1}\right)$$

As a consequence, using equation (19), (7) can be rewritten as

$$\begin{aligned}\frac{r_2 - r_1}{r_1} &= \frac{\gamma^* (\epsilon_2 - \epsilon_1)}{\gamma_1 \epsilon_1} + \frac{\epsilon^*}{\epsilon_1}\left(-\frac{\theta_1}{\theta_2}\right)\left(\frac{\theta_2 - \theta_1}{\theta_1}\right) = \\ &= \frac{\gamma^* (\epsilon_2 - \epsilon_1)}{\gamma_1 \epsilon_1} + \frac{\epsilon^*}{\epsilon_1}\left(-\frac{\theta_1}{\theta_2}\right)\left[\sum_j \frac{s_j^* (\theta_{2,j} - \theta_{1,j})}{\sum_j s_{1,j}\theta_{1,j}} + \right. \\ &\quad \left. + \sum_j \frac{\theta_j^* (s_{2,j} - s_{1,j})}{\sum_j s_{1,j}\theta_{1,j}}\right] \end{aligned} \tag{20}$$

At this stage it is possible to relax the hypothesis that $\epsilon_j = \epsilon$ for every j. Notice that

$$\epsilon = \frac{\pi}{wn} = \frac{\sum_j \pi_j}{\sum_j w_j n_j} = \sum_j \frac{w_j n_j}{wn}\frac{\pi_j}{w_j n_j} = \sum_j s_j \epsilon_j \tag{21}$$

On the basis of (10), (11), (21), let us focus on the first term of equation (20)

$$\begin{aligned}\frac{\gamma^* (\epsilon_2 - \epsilon_1)}{\gamma_1 \epsilon_1} &= \frac{\gamma^*}{\gamma_1}\left[\sum_j \frac{s_j^* (\epsilon_{2,j} - \epsilon_{1,j})}{\sum_j s_{1,j}\epsilon_{1,j}} + \sum_j \frac{\epsilon_j^* (s_{2,j} - s_{1,j})}{\sum_j s_{1,j}\epsilon_{1,j}}\right] = \\ &= \frac{\gamma^*}{\gamma_1}\left[\sum_j \frac{s_j^* \epsilon_{1,j}}{\sum_j s_{1,j}\epsilon_{1,j}}\frac{(\epsilon_{2,j} - \epsilon_{1,j})}{\epsilon_{1,j}} + \sum_j \frac{\epsilon_j^* (s_{2,j} - s_{1,j})}{\sum_j s_{1,j}\epsilon_{1,j}}\right] = \\ &= \frac{\gamma^*}{\gamma_1}\left\{\sum_j \frac{s_j^* \epsilon_{1,j}}{\sum_j s_{1,j}\epsilon_{1,j}}\left[\frac{\frac{p_y}{w}\Big|_j^* \left(\frac{y}{n}\Big|_{2,j} - \frac{y}{n}\Big|_{1,j}\right)}{\frac{p_y}{w}\Big|_{1,j}\frac{y}{n}\Big|_{1,j} - 1} + \frac{\frac{y}{n}\Big|_j^* \left(\frac{p_y}{w}\Big|_{2,j} - \frac{p_y}{w}\Big|_{1,j}\right)}{\frac{p_y}{w}\Big|_{1,j}\frac{y}{n}\Big|_{1,j} - 1}\right] + \right. \\ &\quad \left. + \sum_j \frac{\epsilon_j^* (s_{2,j} - s_{1,j})}{\sum_j s_{1,j}\epsilon_{1,j}}\right\} \end{aligned} \tag{22}$$

In this way, one can decompose the change in the profits/wages ratio into

a productivity effect ($\sum_j \frac{s_j^* \epsilon_{1,j}}{\sum_j s_{1,j}\epsilon_{1,j}} \frac{\frac{py}{w}\big|_j^* \left(\frac{y}{n}\big|_{2,j} - \frac{y}{n}\big|_{1,j} \right)}{\frac{py}{w}\big|_{1,j} \frac{y}{n}\big|_{1,j} - 1}$), a relative price effect ($\sum_j \frac{s_j^* \epsilon_{1,j}}{\sum_j s_{1,j}\epsilon_{1,j}} \frac{\frac{y}{n}\big|_j^* \left(\frac{py}{w}\big|_{2,j} - \frac{py}{w}\big|_{1,j} \right)}{\frac{py}{w}\big|_{1,j} \frac{y}{n}\big|_{1,j} - 1}$) and a *labour shift effect* ($\sum_j \frac{\epsilon_j^* (s_{2,j} - s_{1,j})}{\sum_j s_{1,j}\epsilon_{1,j}}$).

The *labour shift effects* contained in (20) and (22) can be further decomposed on the basis of the following equation

$$\begin{aligned} \frac{s_{2,j} - s_{1,j}}{s_{1,j}} &= \frac{\frac{w_{2,j}n_{2,j}}{w_2 n_2} - \frac{w_{1,j}n_{1,j}}{w_1 n_1}}{\frac{w_{1,j}n_{1,j}}{w_1 n_1}} = \frac{\omega_{2,j}\mathbf{s}_{2,j} - \omega_{1,j}\mathbf{s}_{1,j}}{\omega_{1,j}\mathbf{s}_{1,j}} = \\ &= \frac{\omega_j^* \left(\mathbf{s}_{2,j} - \mathbf{s}_{1,j} \right)}{\omega_{1,j}\mathbf{s}_{1,j}} + \frac{\mathbf{s}_j^* \left(\omega_{2,j} - \omega_{1,j} \right)}{\omega_{1,j}\mathbf{s}_{1,j}} \end{aligned} \tag{23}$$

where $\omega_j = \frac{w_j}{w}$ and where $\frac{\omega_j^* (\mathbf{s}_{2,j} - \mathbf{s}_{1,j})}{\omega_{1,j}\mathbf{s}_{1,j}}$ is the *employment shift effect* and $\frac{\mathbf{s}_j^* (\omega_{2,j} - \omega_{1,j})}{\omega_{1,j}\mathbf{s}_{1,j}}$ is a *relative wage change effect*.

Applying (23), equation (20) becomes

$$\begin{aligned} \frac{r_2 - r_1}{r_1} &= \frac{\gamma^* (\epsilon_2 - \epsilon_1)}{\gamma_1 \epsilon_1} + \frac{\epsilon^*}{\epsilon_1} \left(-\frac{\theta_1}{\theta_2} \right) \sum_j \frac{s_j^* (\theta_{2,j} - \theta_{1,j})}{\sum_j s_{1,j}\theta_{1,j}} + \frac{\epsilon^*}{\epsilon_1} \left(-\frac{\theta_1}{\theta_2} \right) \sum_j \frac{\theta_j^* (s_{2,j} - s_{1,j})}{\sum_j s_{1,j}\theta_{1,j}} = \\ &= \left[\frac{\gamma^* (\epsilon_2 - \epsilon_1)}{\gamma_1 \epsilon_1} + \frac{\epsilon^*}{\epsilon_1} \left(-\frac{\theta_1}{\theta_2} \right) \sum_j \frac{s_j^* (\theta_{2,j} - \theta_{1,j})}{\sum_j s_{1,j}\theta_{1,j}} + \right. \\ &\quad \left. + \frac{\epsilon^*}{\epsilon_1} \left(-\frac{\theta_1}{\theta_2} \right) \sum_j \frac{\theta_j^* s_{1,j}}{\sum_j s_{1,j}\theta_{1,j}} \frac{s_{2,j} - s_{1,j}}{s_{1,j}} \right] \\ &= \left\{ \frac{\gamma^* (\epsilon_2 - \epsilon_1)}{\gamma_1 \epsilon_1} + \frac{\epsilon^*}{\epsilon_1} \left(-\frac{\theta_1}{\theta_2} \right) \sum_j \frac{s_j^* (\theta_{2,j} - \theta_{1,j})}{\sum_j s_{1,j}\theta_{1,j}} + \right. \\ &\quad \left. + \frac{\epsilon^*}{\epsilon_1} \left(-\frac{\theta_1}{\theta_2} \right) \sum_j \frac{\theta_j^* s_{1,j}}{\sum_j s_{1,j}\theta_{1,j}} \left[\frac{\omega_j^* \left(\mathbf{s}_{2,j} - \mathbf{s}_{1,j} \right)}{\omega_{1,j}\mathbf{s}_{1,j}} + \frac{\mathbf{s}_j^* \left(\omega_{2,j} - \omega_{1,j} \right)}{\omega_{1,j}\mathbf{s}_{1,j}} \right] \right\} \end{aligned} \tag{24}$$

While equation (22) turns out to be

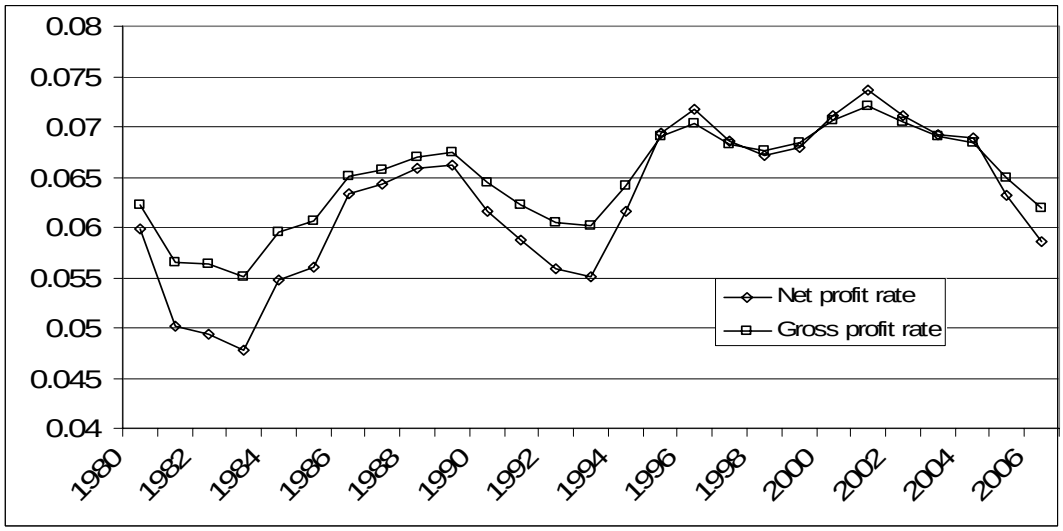
$$\begin{aligned}
\frac{\gamma^*\left(\epsilon_2-\epsilon_1\right)}{\gamma_1\epsilon_1} &= \frac{\gamma^*}{\gamma_1}\left\{\sum_j \frac{s_j^*\epsilon_{1,j}}{\sum_j s_{1,j}\epsilon_{1,j}}\left[\frac{\frac{p_y}{w}\Big|_j^*\left(\frac{y}{n}\Big|_{2,j}-\frac{y}{n}\Big|_{1,j}\right)}{\frac{p_y}{w}\Big|_{1,j}\frac{y}{n}\Big|_{1,j}-1}+\frac{\frac{y}{n}\Big|_j^*\left(\frac{p_y}{w}\Big|_{2,j}-\frac{p_y}{w}\Big|_{1,j}\right)}{\frac{p_y}{w}\Big|_{1,j}\frac{y}{n}\Big|_{1,j}-1}\right]+\right. \\
&\left.+\sum_j \frac{\epsilon_j^*\left(s_{2,j}-s_{1,j}\right)}{\sum_j s_{1,j}\epsilon_{1,j}}\right\} \\
&= \frac{\gamma^*}{\gamma_1}\left\{\sum_j \frac{s_j^*\epsilon_{1,j}}{\sum_j s_{1,j}\epsilon_{1,j}}\left[\frac{\frac{p_y}{w}\Big|_j^*\left(\frac{y}{n}\Big|_{2,j}-\frac{y}{n}\Big|_{1,j}\right)}{\frac{p_y}{w}\Big|_{1,j}\frac{y}{n}\Big|_{1,j}-1}+\frac{\frac{y}{n}\Big|_j^*\left(\frac{p_y}{w}\Big|_{2,j}-\frac{p_y}{w}\Big|_{1,j}\right)}{\frac{p_y}{w}\Big|_{1,j}\frac{y}{n}\Big|_{1,j}-1}\right]+\right. \\
&\left.+\sum_j \frac{\epsilon_j^* s_{1,j}}{\sum_j s_{1,j}\epsilon_{1,j}}\frac{\left(s_{2,j}-s_{1,j}\right)}{s_{1,j}}\right\} \\
&= \frac{\gamma^*}{\gamma_1}\left\{\sum_j \frac{s_j^*\epsilon_{1,j}}{\sum_j s_{1,j}\epsilon_{1,j}}\left[\frac{\frac{p_y}{w}\Big|_j^*\left(\frac{y}{n}\Big|_{2,j}-\frac{y}{n}\Big|_{1,j}\right)}{\frac{p_y}{w}\Big|_{1,j}\frac{y}{n}\Big|_{1,j}-1}+\frac{\frac{y}{n}\Big|_j^*\left(\frac{p_y}{w}\Big|_{2,j}-\frac{p_y}{w}\Big|_{1,j}\right)}{\frac{p_y}{w}\Big|_{1,j}\frac{y}{n}\Big|_{1,j}-1}\right]+\right. \\
&\left.+\sum_j \frac{\epsilon_j^* s_{1,j}}{\sum_j s_{1,j}\epsilon_{1,j}}\left[\frac{\omega_j^*\left(\mathbf{s}_{2,j}-\mathbf{s}_{1,j}\right)}{\omega_{1,j}\mathbf{s}_{1,j}}+\frac{\mathbf{s}_j^*\left(\omega_{2,j}-\omega_{1,j}\right)}{\omega_{1,j}\mathbf{s}_{1,j}}\right]\right\} \qquad (25)
\end{aligned}$$

Substituting then (25) in (24) one can obtain

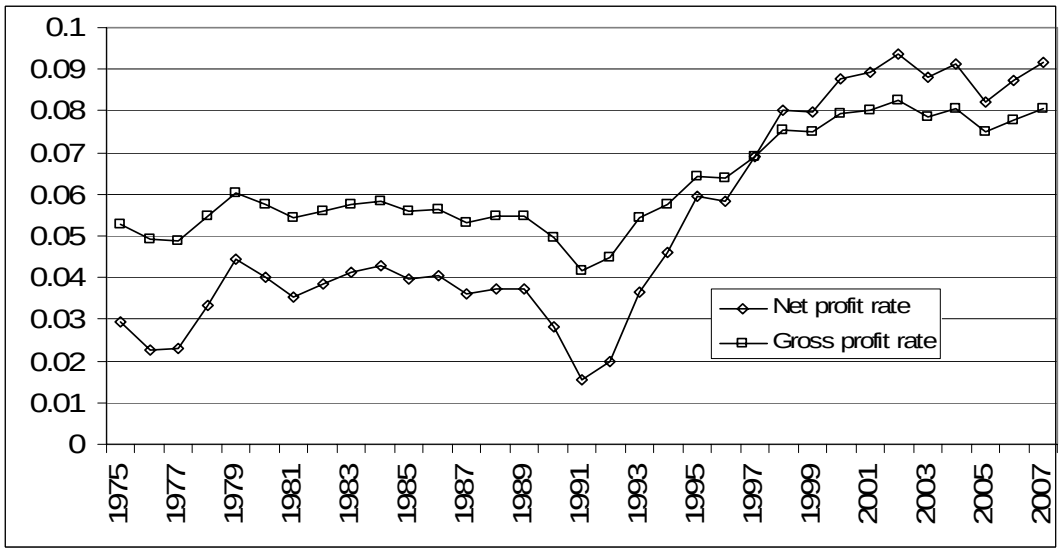
$$\begin{aligned}
\frac{r_2-r_1}{r_1} &= \frac{\gamma^*}{\gamma_1}\left\{\sum_j \frac{s_j^*\epsilon_{1,j}}{\sum_j s_{1,j}\epsilon_{1,j}}\left[\frac{\frac{p_y}{w}\Big|_j^*\left(\frac{y}{n}\Big|_{2,j}-\frac{y}{n}\Big|_{1,j}\right)}{\frac{p_y}{w}\Big|_{1,j}\frac{y}{n}\Big|_{1,j}-1}+\frac{\frac{y}{n}\Big|_j^*\left(\frac{p_y}{w}\Big|_{2,j}-\frac{p_y}{w}\Big|_{1,j}\right)}{\frac{p_y}{w}\Big|_{1,j}\frac{y}{n}\Big|_{1,j}-1}\right]+\right. \\
&\left.+\sum_j \frac{\epsilon_j^* s_{1,j}}{\sum_j s_{1,j}\epsilon_{1,j}}\left[\frac{\omega_j^*\left(\mathbf{s}_{2,j}-\mathbf{s}_{1,j}\right)}{\omega_{1,j}\mathbf{s}_{1,j}}+\frac{\mathbf{s}_j^*\left(\omega_{2,j}-\omega_{1,j}\right)}{\omega_{1,j}\mathbf{s}_{1,j}}\right]\right\}+ \\
&+\frac{\epsilon^*}{\epsilon_1}\left(-\frac{\theta_1}{\theta_2}\right)\sum_j \frac{s_j^*\left(\theta_{2,j}-\theta_{1,j}\right)}{\sum_j s_{1,j}\theta_{1,j}}+ \\
&+\frac{\epsilon^*}{\epsilon_1}\left(-\frac{\theta_1}{\theta_2}\right)\sum_j \frac{\theta_j^* s_{1,j}}{\sum_j s_{1,j}\theta_{1,j}}\left[\frac{\omega_j^*\left(\mathbf{s}_{2,j}-\mathbf{s}_{1,j}\right)}{\omega_{1,j}\mathbf{s}_{1,j}}+\frac{\mathbf{s}_j^*\left(\omega_{2,j}-\omega_{1,j}\right)}{\omega_{1,j}\mathbf{s}_{1,j}}\right] \qquad (26)
\end{aligned}$$

Fig. 1 – Trends in the rate of profit

Italy, 1980-2007



Finland, 1975-2007



Denmark, 1970-2006

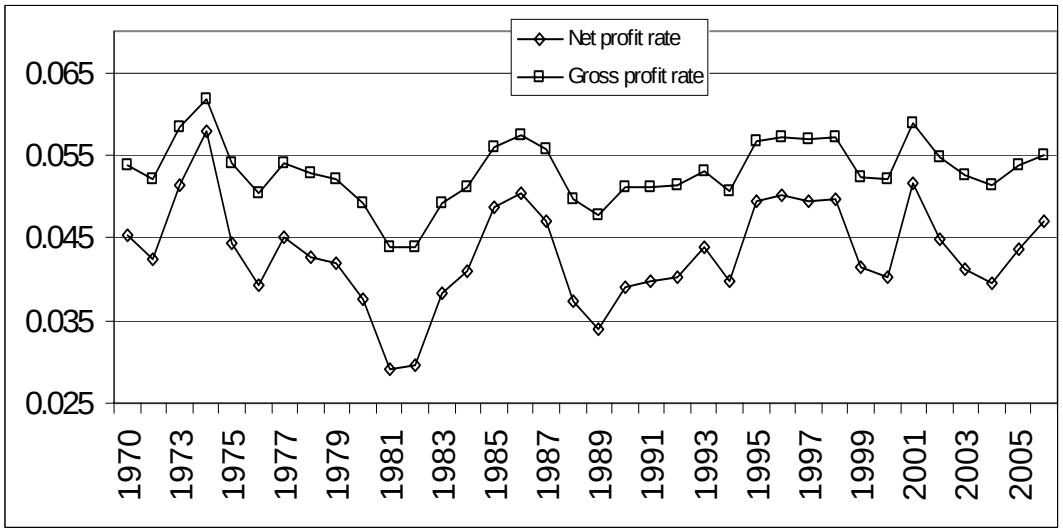
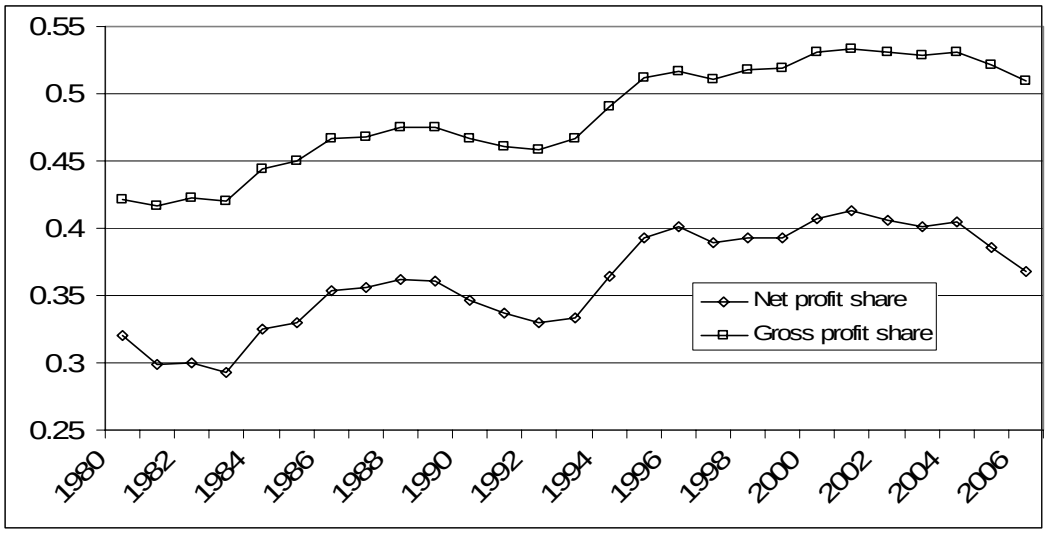
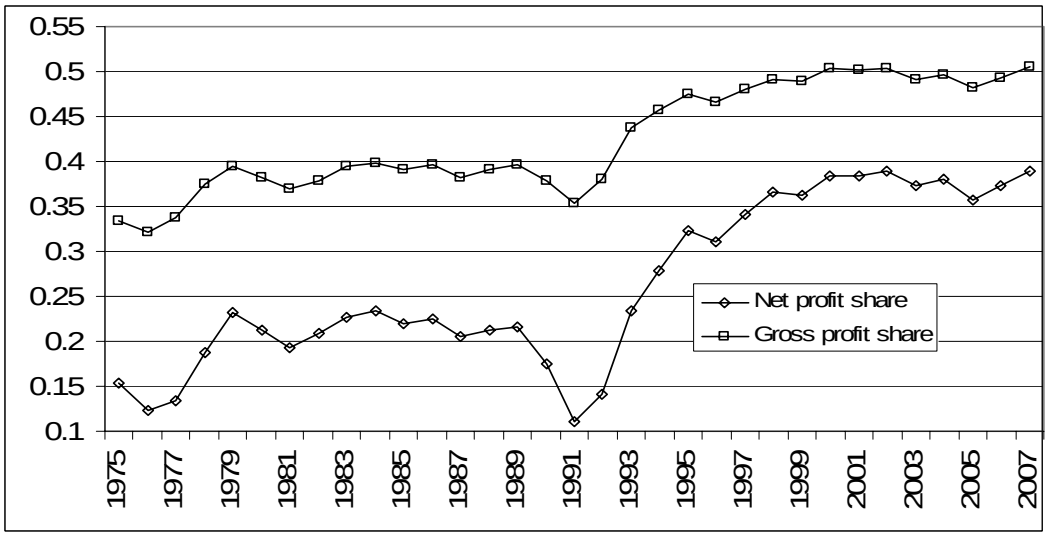


Fig. 2 - Trends in the profit share

Italy, 1980-2007



Finland, 1975-2007



Denmark, 1970-2006

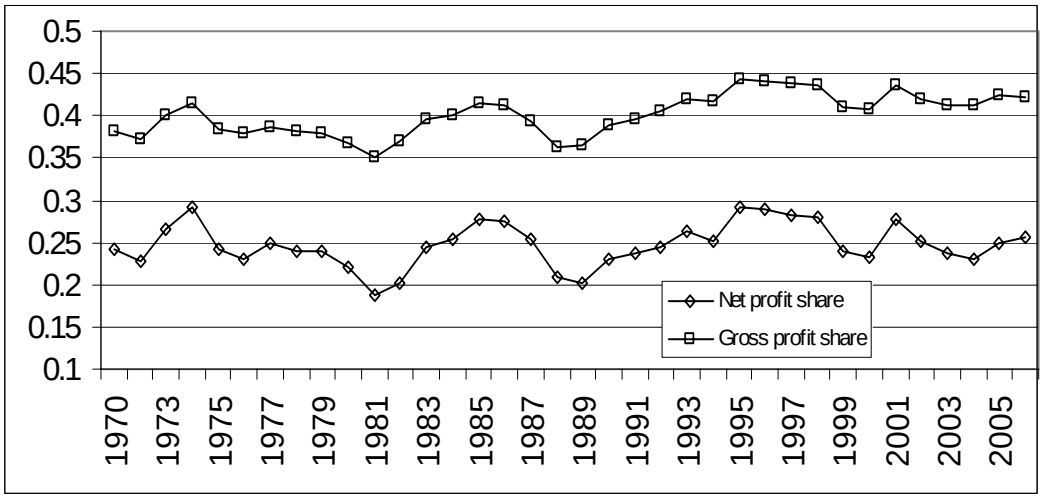
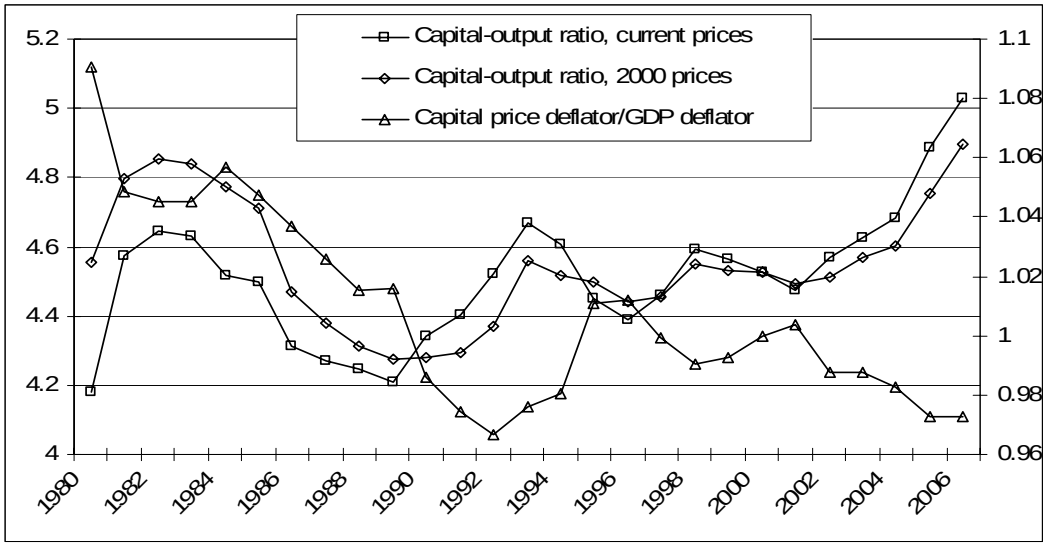
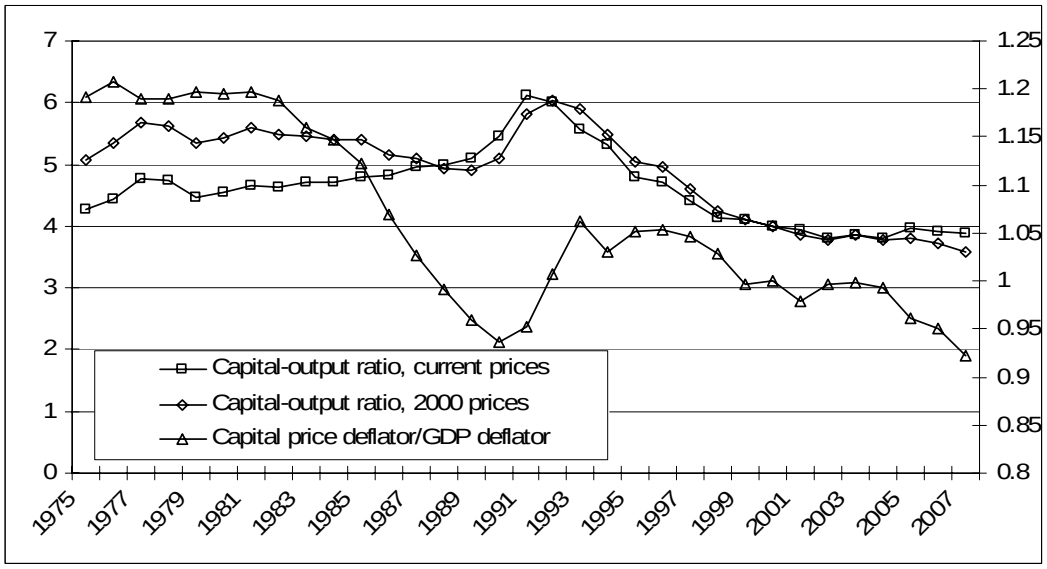


Fig. 3 - Trends in the capital-output ratio and in the ratio between the capital price deflator and the GDP deflator

Italy, 1980-2007



Finland, 1975-2007



Denmark, 1970-2006

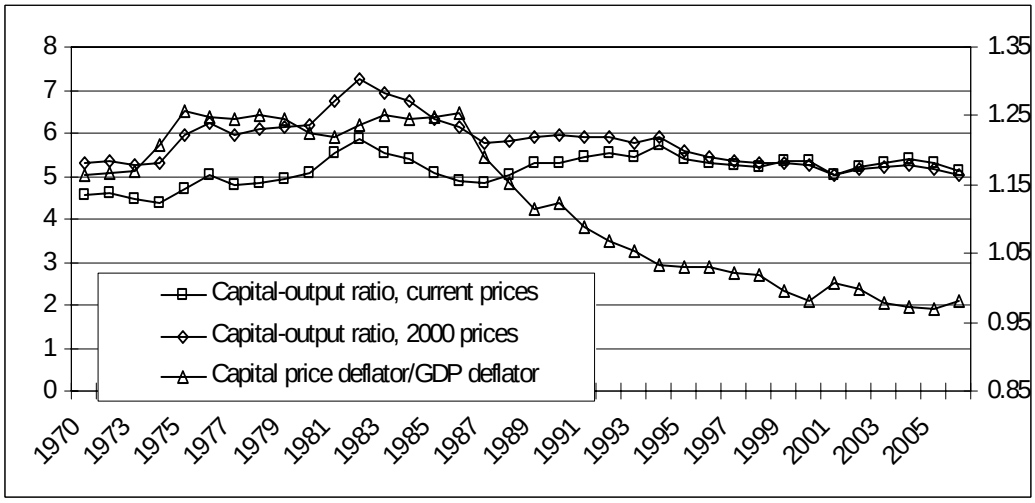
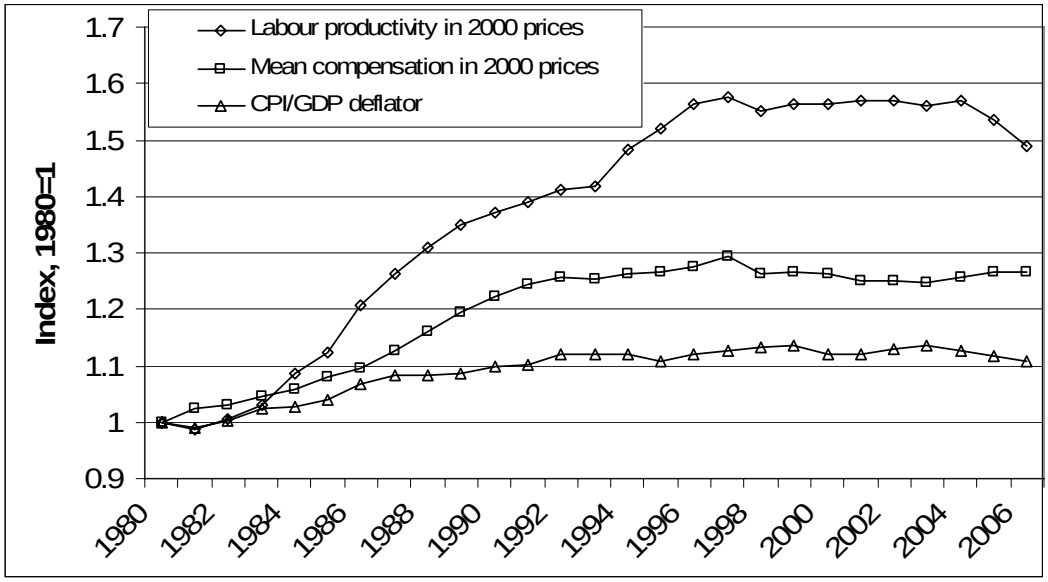
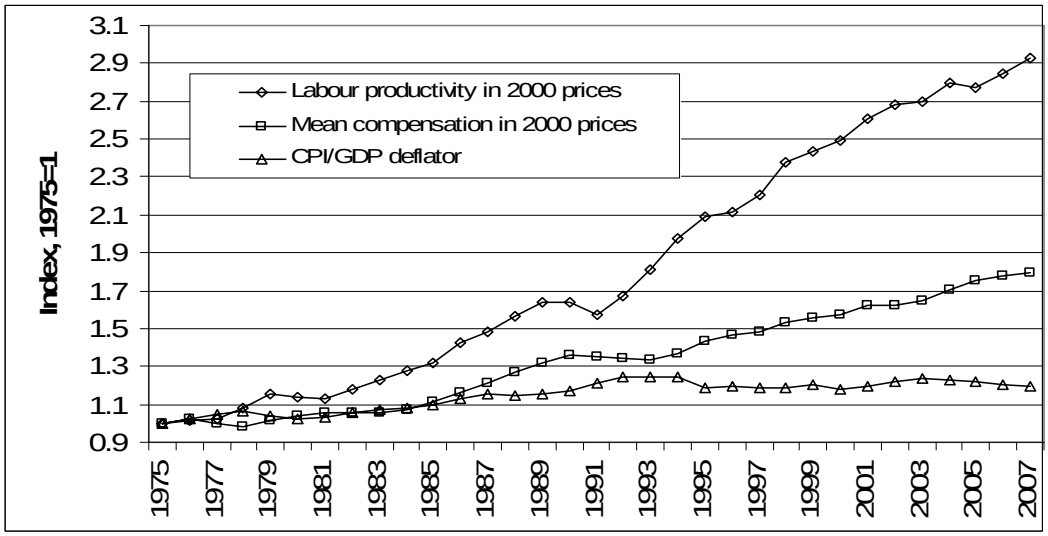


Fig. 4 - Trends in labour productivity, mean compensation and in the ratio CPI/GDP deflator

Italy, 1980-2007



Finland, 1975-2007



Denmark, 1970-2006

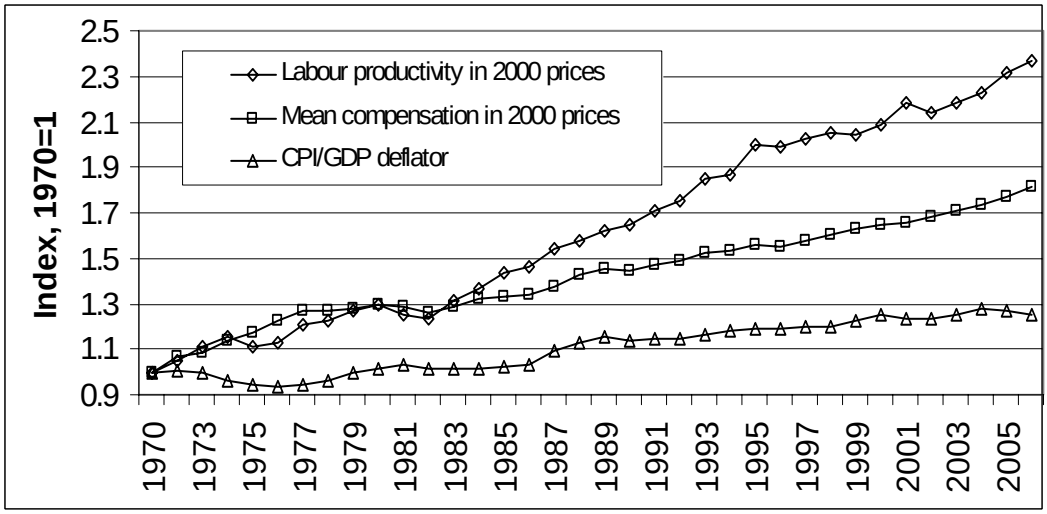
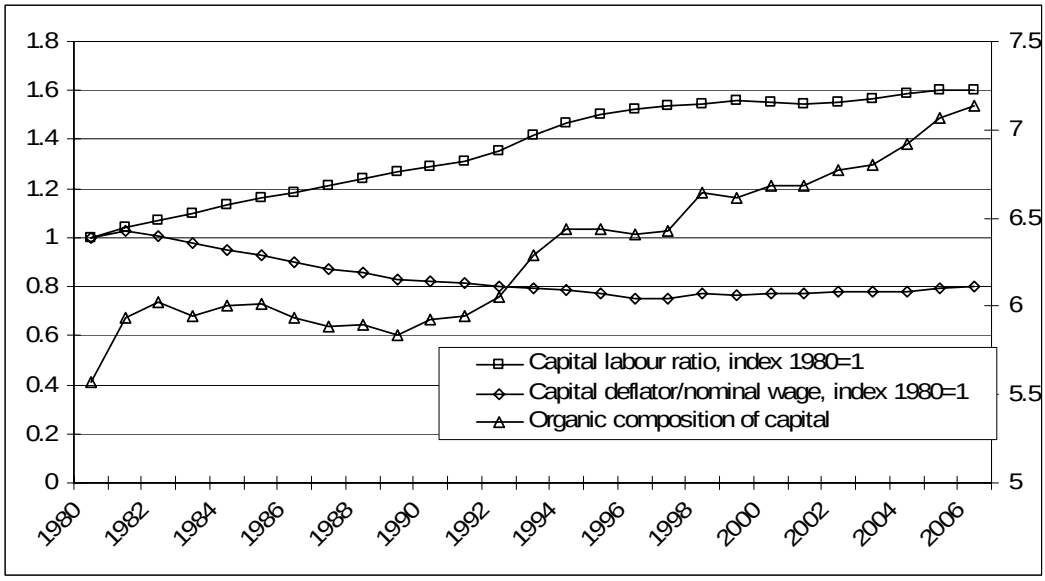
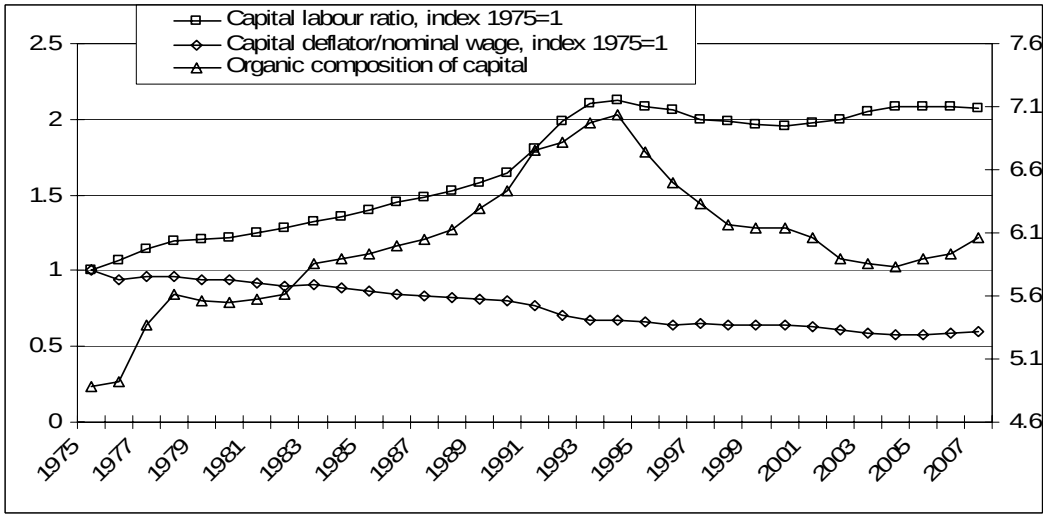


Fig. 5 - Trends in the capital-labour ratio, in the ratio between capital deflator and the nominal wage and in the organic composition of capital

Italy, 1980-2007



Finland, 1975-2007



Denmark, 1970-2006

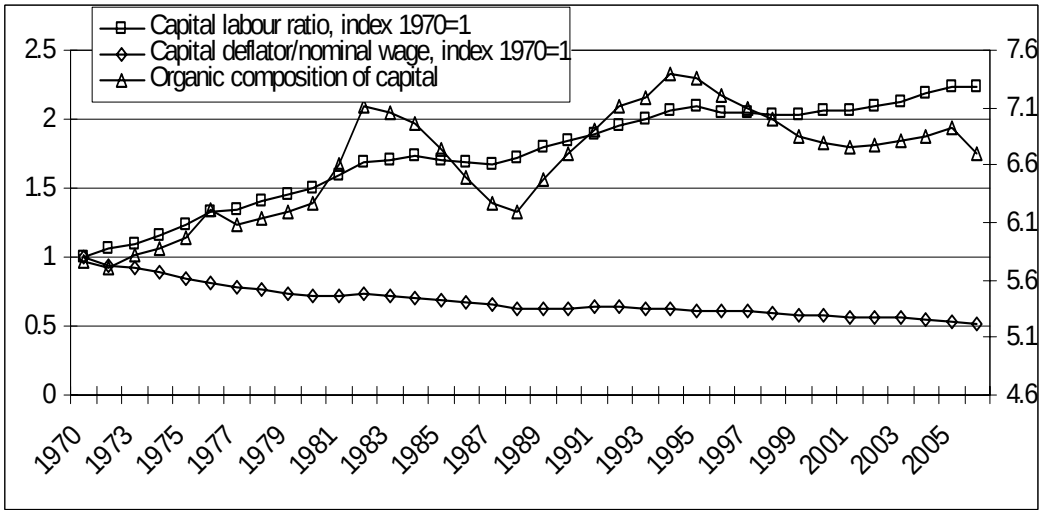


Figure 6 – Wage-profit curves for Italy, Finland and Denmark

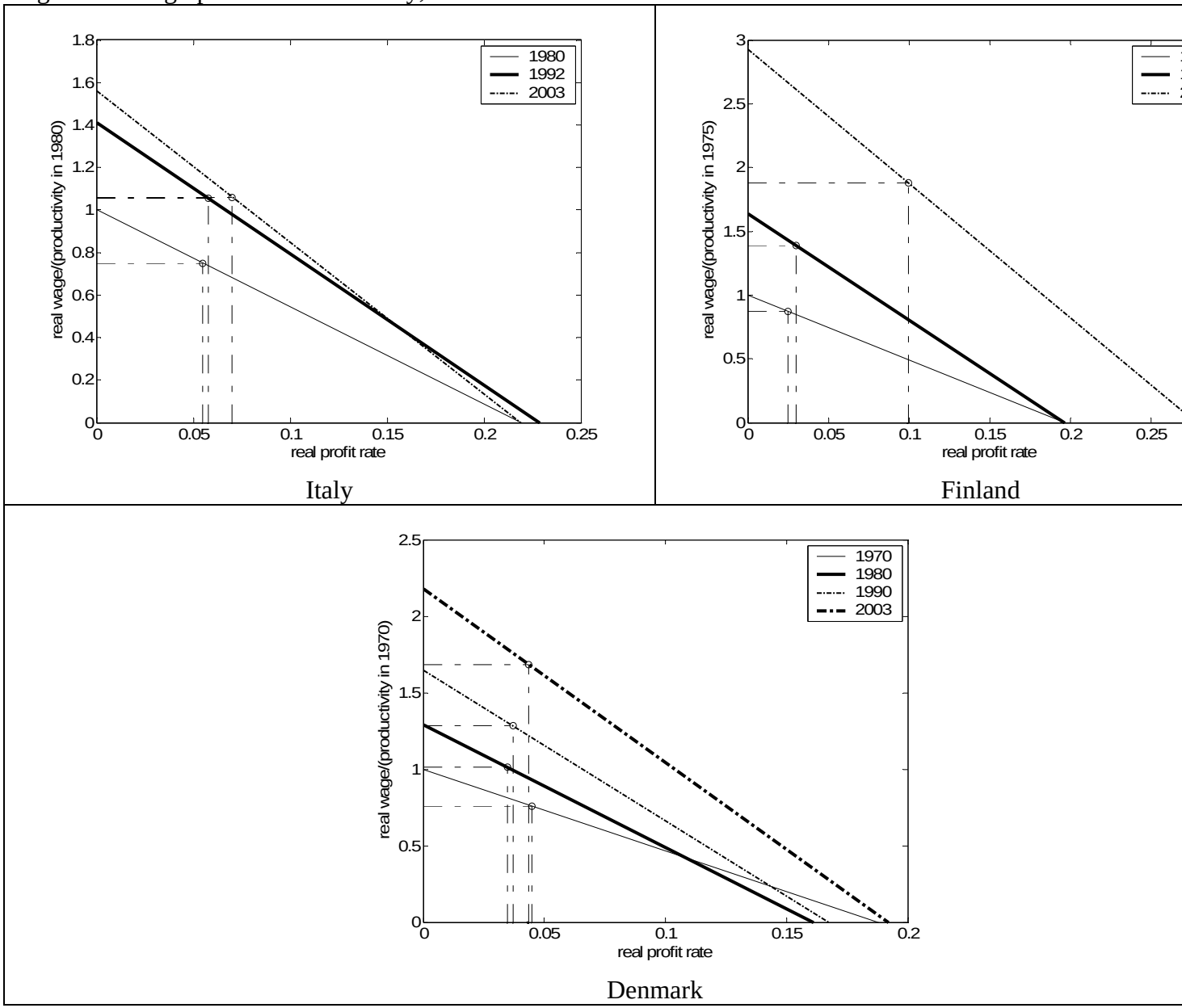


Table 1a – Decomposition of changes in the net rate of profit by period in Denmark, 1970-2006

Years	70-79	80-89	90-02	03-06	70-06
Change in income-capital ratio	-13.34%	4.36%	14.86%	4.12%	5.84%
Change in the profit share	-2.91%	-9.20%	8.81%	8.68%	2.57%
Change in p_y/p_k	6.35%	-8.68%	-12.67%	0.33%	-16.47%
Change in the profits/wages ratio	-3.80%	-11.58%	11.46%	11.36%	3.39%
Change in the organic composition	-6.09%	-1.94%	-0.46%	1.77%	-11.45%
Change in the profit rate	-9.89%	-13.52%	11.00%	13.13%	-8.06%

Table 1b – Decomposition of changes in the net rate of profit by period in Finland, 1975-2007

Years	75-89	90-07	75-07
Change in income-capital ratio	4.33%	69.27%	70.47%
Change in the profit share	46.32%	160.12%	192.90%
Change in p_y/p_k	-24.79%	-2.93%	-52.17%
Change in the profits/wages ratio	55.25%	214.17%	258.67%
Change in the organic composition	-29.39%	12.28%	-47.47%
Change in the profit rate	25.86%	226.45%	211.20%

Table 1c – Decomposition of changes in the net rate of profit by period in Italy, 1980-2006

Years	80-91	92-02	03-06	80-06
Change in income-capital ratio	5.94%	-3.65%	-6.37%	-7.12%
Change in the profit share	3.43%	28.52%	-7.73%	16.40%
Change in p_y/p_k	-11.17%	2.41%	-1.37%	-11.33%
Change in the profits/wages ratio	4.61%	40.21%	-11.15%	22.62%
Change in the organic composition	-6.40%	-12.92%	-4.32%	-24.67%
Change in the profit rate	-1.79%	27.28%	-15.48%	-2.05%

Table 2 – Decomposition of the percentage change in the net profits/total wages ratio by country

Denmark	**70-79**	**80-89**	**90-02**	**03-06**	**70-06**
Actual change in net profits/total wages	-3.93%	-11.70%	11.48%	11.27%	3.59%
Change in labour productivity	98.97%	103.89%	121.50%	37.28%	407.52%
Change in wage/GDP deflator	-102.89%	-115.59%	-110.02%	-26.02%	-403.93%
Finland	**75-89**	**90-07**	**75-07**		
Actual change in net profits/total wages	62.22%	207.91%	286.63%		
Change in labour productivity	421.54%	446.09%	1121.13%		
Change in wage/GDP deflator	-359.31%	-238.18%	-834.50%		
Italy	**80-91**	**92-02**	**03-06**	**80-06**	
Actual change in net profits/total wages	4.75%	42.47%	-11.41%	25.40%	
Change in labour productivity	134.51%	44.58%	-14.52%	167.59%	
Change in wage/GDP deflator	-129.76%	-2.11%	3.11%	-142.19%	

Table 3 – Decomposition of the percentage change in the organic composition by country

Denmark	**70-79**	**80-89**	**90-02**	**03-06**	**70-06**
Change in organic composition	6.62%	2.11%	0.44%	-1.65%	12.67%
Change in capital-labour ratio	39.55%	18.07%	12.32%	4.44%	92.56%
Change in pk/w	-32.92%	-15.96%	-11.88%	-6.08%	-79.88%
Finland	**75-89**	**90-07**	**75-07**		
Change in organic composition	28.89%	-5.68%	24.24%		
Change in capital-labour ratio	52.64%	22.66%	85.64%		
Change in pk/w	-23.75%	-28.34%	-61.40%		
Italy	**80-91**	**92-02**	**03-06**	**80-06**	
Change in organic composition	6.67%	11.93%	4.81%	28.02%	
Change in capital-labour ratio	27.97%	14.72%	2.24%	53.92%	
Change in pk/w	-21.31%	-2.78%	2.57%	-25.90%	

Table 4 – Summary of the decompositions of the net profit rate by country

Denmark	**70-79**	**80-89**	**90-02**	**03-06**	**70-06**
Actual change in the profit rate	-9.89%	-13.52%	11.00%	13.13%	-8.06%
Change in wage/GDP deflator	-99.70%	-114.40%	-109.78%	-26.24%	-381.21%
Total technology effect	89.80%	100.88%	120.78%	39.36%	373.15%
Change in labour productivity	95.89%	102.82%	121.24%	37.60%	384.60%
Change in capital/labour ratio	-36.36%	-16.66%	-12.97%	-4.77%	-83.62%
Change in pk/w	30.27%	14.72%	12.51%	6.53%	72.17%
Finland	**75-89**	**90-07**	**75-07**		
Actual change in the profit rate	25.86%	226.45%	211.20%		
Change in wage/GDP deflator	-319.04%	-245.35%	-753.09%		
Total technology effect	344.90%	471.80%	964.29%		
Change in labour productivity	374.29%	459.52%	1011.76%		
Change in capital/labour ratio	-53.54%	-49.01%	-167.72%		
Change in pk/w	24.16%	61.28%	120.25%		
Italy	**80-91**	**92-02**	**03-06**	**80-06**	
Actual change in the profit rate	-1.79%	27.28%	-15.48%	-2.05%	
Change in wage/GDP deflator	-125.71%	-2.00%	3.03%	-126.63%	
Total technology effect	123.91%	29.28%	-18.51%	124.58%	
Change in labour productivity	130.31%	42.20%	-14.19%	149.25%	
Change in capital/labour ratio	-26.85%	-15.94%	-2.01%	-47.46%	
Change in pk/w	20.45%	3.02%	-2.31%	22.80%	

Table 5 – Panel Unit Root tests on the ratio between industrial profits and wage bills

		Model without a time trend		Model wi
		Probability	Observations	Probability
Italy	Im, Pesaran and Shin W-stat	0.1434	434	0.6855
	ADF - Fisher Chi-square	0.1405	434	0.6463
	PP - Fisher Chi-square	0.6001	442	0.8526
Finland	Im, Pesaran and Shin W-stat	0.1020	380	0.0654
	ADF - Fisher Chi-square	0.1475	380	0.1775
	PP - Fisher Chi-square	0.1824	384	0.4828
Denmark	Im, Pesaran and Shin W-stat	1.0000	588	1.0000
	ADF - Fisher Chi-square	1.0000	588	1.0000
	PP - Fisher Chi-square	1.0000	595	1.0000

Note: lags were automatically selected on the basis the Schwartz Information Criterion. We relied on the selection using a Bartlett kernel. For Finland, the sectors Agriculture, Hunting, Forestry and Fishing, Textiles, tex footwear, Wood and products of wood and cork, Transport equipment and Construction were excluded becau stationary

Table 6 – Sectoral decompositions of the capital labour ratio by country

Denmark	**70-79**	**80-89**	**90-02**	**03-06**	**70-06**
Change in capital labour ratio	45.67%	19.49%	13.05%	4.57%	122.97%
Change in sectoral capital labour ratios	21.66%	3.70%	2.51%	2.51%	43.65%
Employment shift	24.00%	15.79%	10.54%	2.07%	79.32%
Finland	**75-89**	**90-07**	**75-07**		
Change in capital labour ratio	57.97%	25.91%	107.05%		
Change in sectoral capital labour ratios	22.11%	7.01%	40.46%		
Employment shift	35.87%	18.90%	66.58%		
Italy	**80-91**	**92-02**	**03-06**	**80-06**	
Change in capital labour ratio	30.82%	14.91%	2.21%	59.88%	
Change in sectoral capital labour ratios	-14.72%	-0.95%	0.79%	-20.24%	
Employment shift	45.54%	15.86%	1.42%	80.12%	

Table 7 – Sectoral decompositions of the organic composition by country

Denmark	**70-79**	**80-89**	**90-02**	**03-06**	**70-06**
Change in organic composition	6.62%	2.11%	0.44%	-1.65%	12.67%
Change in sectoral organic compositions	-10.57%	-14.49%	-8.38%	-2.77%	-44.05%
Wage bill shift	17.19%	16.60%	8.81%	1.13%	56.73%
Finland	**75-89**	**90-07**	**75-07**		
Change in organic composition	28.89%	-5.68%	24.24%		
Change in sectoral organic compositions	0.56%	-20.30%	-20.87%		
Wage bill shift	28.33%	14.62%	45.12%		
Italy	**80-91**	**92-02**	**03-06**	**80-06**	
Change in organic composition	6.67%	11.93%	4.81%	28.02%	
Change in sectoral organic compositions	-9.77%	5.30%	3.13%	-1.42%	
Wage bill shift	16.44%	6.63%	1.68%	29.44%	

Table 8 – Sectoral decompositions of the net profit rate by country

Denmark	**70-79**	**80-89**	**90-02**	**03-06**	**70-06**
Actual change in the profit rate	-9.89%	-13.52%	11.00%	13.13%	-8.06%
Change in net profits over total wages	-3.80%	-11.58%	11.46%	11.36%	3.39%
Sectoral productivity effect	77.97%	78.05%	103.61%	30.64%	320.90%
Sectoral real wage effect	-94.54%	-102.98%	-97.53%	-20.63%	-352.22%
Wage bill shift	12.77%	13.35%	5.37%	1.35%	34.70%
Employment shift	13.56%	13.59%	5.36%	1.59%	38.39%
Sectoral relative wage effect	-0.79%	-0.23%	0.02%	-0.24%	-3.69%
Change in organic composition	-6.09%	-1.94%	-0.46%	1.77%	-11.45%
Change in sectoral organic compositions	9.72%	13.36%	8.82%	2.98%	39.80%
Wage bill shift	-15.81%	-15.30%	-9.28%	-1.21%	-51.25%
Employment shift	-17.80%	-13.62%	-10.66%	-2.10%	-53.00%
Sectoral relative wage effect	1.99%	-1.68%	1.38%	0.88%	1.75%
Finland	**75-89**	**90-07**	**75-07**		
Actual change in the profit rate	25.86%	226.45%	211.20%		
Change in net profits over total wages	55.25%	214.17%	258.67%		
Sectoral productivity effect	317.65%	427.19%	945.94%		
Sectoral real wage effect	-288.28%	-223.15%	-732.74%		
Wage bill shift	25.88%	10.13%	45.46%		
Employment shift	23.79%	10.07%	48.46%		
Sectoral relative wage effect	2.09%	0.06%	-2.99%		
Change in organic composition	-29.39%	12.28%	-47.47%		
Change in sectoral organic compositions	-0.57%	43.90%	40.88%		
Wage bill shift	-28.82%	-31.62%	-88.36%		
Employment shift	-30.73%	-36.99%	-97.14%		
Sectoral relative wage effect	1.91%	5.37%	8.79%		
Italy	**80-91**	**92-02**	**03-06**	**80-06**	
Actual change in the profit rate	-1.79%	27.28%	-15.48%	-2.05%	
Change in net profits over total wages	4.61%	40.21%	-11.15%	22.62%	
Sectoral productivity effect	57.17%	9.55%	-14.31%	32.92%	
Sectoral real wage effect	-67.24%	21.35%	1.09%	-39.55%	
Wage bill shift	14.68%	9.31%	2.07%	29.25%	
Employment shift	30.25%	17.31%	2.11%	56.89%	
Sectoral relative wage effect	-15.58%	-8.00%	-0.05%	-27.64%	
Change in organic composition	-6.40%	-12.92%	-4.32%	-24.67%	
Change in sectoral organic compositions	9.38%	-5.75%	-2.81%	1.25%	
Wage bill shift	-15.78%	-7.18%	-1.51%	-25.92%	
Employment shift	-38.36%	-16.95%	-1.34%	-61.05%	
Sectoral relative wage effect	22.58%	9.78%	-0.17%	35.14%	

Table 9 – Models for employment and capital organic composition percentage changes at the industrial level Italy (51 observations).

Dependent variable: employment growth rate in logs							
	Within	**Within**	**Wallace-Hussain**	**Wallace - Hussain**	**Amemya**	**Amemya**	**Nerlove**
	Coeff.	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**
Constant	-	-	-0.5428	-5.3913	-0.5427	-5.3897	-0.5419
Initial level of the organic composition in logs	0.2249	2.5278	0.2264	2.9504	0.2263	2.9489	0.2256
Dependent variable: growth rate of the organic composition in logs							
	Within	**Within**	**Wallace-Hussain**	**Wallace - Hussain**	**Amemya**	**Amemya**	**Nerlove**
	Coeff.	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**
Constant	-	-	0.0981	1.4118	0.099	1.3981	0.1042
Employment growth rate in logs	-0.2872	-2.5365	-0.3132	-3.1319	-0.31	-3.1159	-0.2904
Dependent variable: growth rate of the organic composition in logs							
	Within	**Within**	**Wallace-Hussain**	**Wallace - Hussain**	**Amemya**	**Amemya**	**Nerlove**
	Coeff.	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**	**t-stat.**	**Coeff.**
Constant	-	-	0.2887	2.7987	0.2889	2.801	0.2814
Initial level of the organic composition in logs	-0.822	-1.2444	-0.0879	-1.445	-0.0881	-1.4488	-0.0819

Table 10 – Cross-correlations between domestic output and net profit rate, net profit share, net profits over total wages, total wages over the capital stock and net income over the net capital stock.

	ITALY	Net profit rate	Net profit share	Net profits over wages	Wages over capital stock	Net income over net capital stock	Obs.
HP filter	**Contemporaneous correlation**	0.4661*	0.4235*	0.4357*	0.3322	0.4757*	27
	First lag	0.3584	0.3578	0.3504	0.1521	0.3198	26
	Second lag	0.0743	0.1162	0.1061	-0.1469	-0.0119	25
	First lead	-0.0018	-0.0951	-0.0688	0.3490	0.1471	26
	Second lead	-0.4799*	-0.5521*	-0.5517*	0.2588	-0.2726	25
Band Pass Filter	**Contemporaneous correlation**	0.5567*	0.5143*	0.5291*	0.3102	0.5777*	21
	First lag	0.3498	0.3667	0.3638	-0.024	0.2727	20
	Second lag	0.0112	0.0633	0.0545	-0.288	-0.1101	10
	First lead	0.0694	-0.0686	-0.032	0.5373*	0.2888	20
	Second lead	-0.4834*	-0.5882*	-0.5858*	0.3663	-0.2147	19
	FINLAND						
HP filter	**Contemporaneous correlation**	0.4718*	0.4275*	0.4736*	0.2176	0.5174*	33
	First lag	0.4514*	0.5125*	0.4587*	0.0939	0.4359*	32
	Second lag	0.1590	0.1767	0.1462	0.0743	0.1736	31
	First lead	-0.2166	-0.3146	-0.2329	0.2226	-0.0771	32
	Second lead	-0.5474*	-0.6786*	-0.6081*	0.0755	-0.4371*	31
Band Pass Filter	**Contemporaneous correlation**	0.4501*	0.4300*	0.4614*	0.2105	0.4850*	27
	First lag	0.5095*	0.5509*	0.5097*	0.1151	0.4978*	26
	Second lag	0.1993	0.1766	0.1637	0.1951	0.2606	25
	First lead	-0.2689	-0.3385	-0.2806	0.1982	-0.1682	25
	Second lead	-0.6300*	-0.7503*	-0.7022*	0.1976	-0.4699*	26
	DENMARK						
HP filter	**Contemporaneous correlation**	0.4886*	0.3306*	0.3500*	0.7474*	0.7461*	36
	First lag	0.3543*	0.2919	0.2910	0.3771*	0.4585*	35
	Second lag	-0.0558	-0.0503	-0.0674	0.1660	0.0328	34
	First lead	-0.3357*	-0.4296*	-0.4138*	0.2989	-0.1033	35
	Second lead	-0.6215*	-0.5958*	-0.5912*	-0.2883	-0.6024*	34
Band Pass Filter	**Contemporaneous correlation**	0.5260*	0.3759*	0.3946*	0.7580*	0.7668*	30
	First lag	0.3138	0.2504	0.2479	0.3795*	0.4198*	29
	Second lag	-0.0578	-0.0520	-0.0714	0.1593	0.0249	28
	First lead	-0.3946*	-0.4799*	-0.4688*	0.3270	-0.1222	29
	Second lead	-0.5788*	-0.5461*	-0.5453*	-0.2448	-0.5475*	28

Note: HP filter and Band Pass filter refer to the components derived using the Hodrick-Prescott and band-pass filters, respectively. The correlations reported are between the contemporaneous values of de-trended domestic output and the jth lag or lead of the variables indicated at the head of the columns.