An empirical investigation on the gravitation and convergence of industry return rates in OECD countries

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Abstract

Tests are offered for the hypotheses that sectoral average profit rates and incremental return rates are gravitating around or converging towards a common value. We study data for various OECD countries relying on an econometric method able to account for residual autocorrelation and cross-sector correlation. Our null hypotheses receive only a mixed empirical support. This is interpreted as the result of various kinds of limitations to capital mobility. Policy implications are discussed.

Keywords: capital mobility, gravitation of profit rates, convergence, SURE estimation, exactly median unbiased estimator, industrial average profit rates, incremental return rates

JEL Codes: L16, L19, L60, L70, L80, L90, B51, B52

1. Introduction and key concepts

The present work is devoted to the empirical study of the tendency of industry profit rates to either converge towards or gravitate around a common value, due to the *mobility of capital*, namely its migration from low profit sectors to high profit ones. We show a new econometric method to test these hypotheses - able to account for residual autocorrelation and cross-sector correlation - as well as we consider economies with different degrees of product market regulations and exposure to international trade (Høj et al. 2007). Moreover, these are the countries with the most complete data in the STAN OECD database, which contains information based on a specific effort to allow cross-industry and cross-country comparability. However, we do not stop here. We apply sound econometric testing to US data too in order to see whether our results can be replicated for a large economy with a better definition of profits and to check the conclusions achieved by the previous literature on the basis of descriptive evidence.

The issues of convergence and gravitation of profit rates are important under several grounds. On the theoretical side, prices of production, that are the subject of a vast literature after the work of Piero Sraffa, are defined as the prices that are charged when sectoral profit rates are equal. Furthermore, if sectoral profit rates do not gravitate around or converge towards a common value, it will mean that arbitrage does not take place and profitable opportunities are not exploited. Therefore, it will be interesting to understand why it is so and what can be done about it.

In order to introduce our topic, some definitions are warranted. After D'Orlando (2007), we define "*convergence* towards long-period positions" as "the movement of actual magnitudes towards their long-period counterparts" driven by the mobility of capital. In other words, we make reference to a situation where industry profit rates initially differ, but they tend to collapse towards a common value. We refer to *gravitation*, instead, as "the random oscillation of actual magnitudes around their long-period counterparts". Convergence is therefore a prerequisite for gravitation. We give a graphic account of these definitions in Figure 1, which depicts the deviations of two simulated sectoral profit rates from their mean under the hypotheses of convergence and gravitation.

[Figure 1 about here]

The way we use the term convergence is therefore different from the one adopted for instance in Tsoulfidis and Tsaliki (2005). This difference helps also us to better distinguish between *neo-classical and classical competition*, which has been the object of a growing number of both theoretical and historic contributions such as Shaikh (1980), Duménil and Lévy (1987), Shaikh (2008) and Tsoulfidis and Tsaliki (2005) itself. Convergence is used there to indicate the actual and instantaneous equalization of profit rates that takes place under neoclassical perfect competition, a quiet state of equilibrium, where fully informed, rational and symmetric agents operate in a market without entry or exit barriers taking prices as given. This is opposed to the "tendential equalization" of profit rates that, according to classical economists, Marx and Schumpeter, takes place in a turbulent fashion due to capital moving from one sector to another in search for the highest possible profit. Duménil and Lévy (1993, pp. 69-73), presenting classical economists' and Marx's thought, write that capital mobility among economic sectors can take two forms, either firms' entry-exit decisions - Marx and Smith's view - or credit flows - Ricardo's view. They also discuss the theoretical implications of possible *limitations to capital mobility*, due to investors' lack of information about profitable opportunities.

In this paper, even when using the term convergence, we do not exclude that the time series of the sectoral deviations of return rates from their average have a stochastic component which prevents actual equalization to take place. So according to our terminology convergence and gravitation are two forms of tendential equalization.

One further concept to consider is the one of *persistence*, which can be defined as the time a variable takes to go back to its long-run value after a shock. Various measures of persistence have been proposed by the literature and surveys are offered for instance by Andrews and Chen (1994) and by Robalo Marques (2004). On the basis of our definition of persistence, we might have that some time-series are actually gravitating around or converging towards their mean, but that these processes are slow because their deviation from the mean are persistent.

Return rates can be defined in different ways. The literature concentrated on those of average profit rates and incremental return rates. The *average profit rate* (π_t) is the ratio of total profits (P_t) to the current cost value of the capital stock (K_t):

$$\pi_t = \frac{P_t}{K_t} \tag{1}$$

Shaikh (1997), Tsoulfidis and Tsaliki (2005) and Shaikh (2008), instead, advanced the concept of *incremental rate of return* (IROR) as connected to that of *regulating capital*. Capital can be termed “regulating” when it embodies “the best-practice methods of production” (Tsoulfidis and Tsaliki, 2005, p. 13) or, otherwise, “the lowest cost methods operating under generally reproducible conditions” (Shaikh, 2008, p. 167). Incremental returns are those that are gained over regulating capitals. According to these authors, the tendential equalization (either convergence or gravitation) of profit rates in different sectors does not take place for average profit rates, but only for incremental ones. This is because individual capitals, accumulated in the past, cannot easily switch to best-practice methods of production, which are adopted only by new capitals flowing into a sector, as a consequence heterogeneous *average* profit rates both within and between sectors exist and neither gravitation nor convergence would take place among them. Shaikh (1997) proposed to approximate IROR along the following lines. Total current profits are composed by profits from the most recent investments ($IROR_t \cdot I_{t-1}$) and profits from all previous investments (P^*):

$$P_t = IROR_t \cdot I_{t-1} + P^* \qquad (2)$$

Subtracting from both sides of (2) profits lagged one period, it is possible to obtain

$$P_t - P_{t-1} = IROR_t \cdot I_{t-1} + (P^* - P_{t-1}) \qquad (3)$$

At this stage, it is assumed that $P^* = P_{t-1}$ on the ground that for short term horizons - up to one year according to Shaikh (1997) - current profits on carried-over vintages of capital goods (P^*) are close to last period's profit on the same capital goods (P_{t-1}). Therefore it is possible to write

$$IROR_t = \frac{\Delta P_t}{I_{t-1}} \qquad (4)$$

where Δ is the first-difference operator.

The rest of this paper is structured as follows. The next section reviews the relevant literature. Being the nature of the present contribution empirical, we will focus on empirical studies. Section 3 illustrates our data and methods. Section 4 presents our results, while the last section concludes and discusses the policy implications of our work.

2. Review of the empirical literature

A number of studies has been devoted to the issue this contribution is concerned with. Glick and Ehrbar (1988) consider the profit rates of 13 manufacturing sectors between 1970 and 1979 for France, Germany, Italy, the United Kingdom, and the United States allowing for sector and time specific effects and using a maximum likelihood approach to the modelling of serial correlation in the disturbances. They found scant support for the theory of profit rate equalization across sectors when defining the profit rate as the ratio of gross value added minus employee compensation over the gross stock of capital at replacement cost. Once deducting from profit indirect taxes, net interest, and an estimate of the non-corporate wage equivalent and adding inventories to the stock of capital, their econometric evidence is still against the hypothesis of profit equalization, though to a lesser extent. Relying on a weighted least squares estimator, Glick and Ehrbar (1990) produce similar results to Glick and Ehrbar (1988) and they find a significant correlation between profit standard deviation and a measure of industry long-run profit rates in US manufacturing. This could entail that investors require higher remunerations in riskier industries, if one is ready to accept profit standard deviation as a measure of risk.

Duménil and Lévy (2002) present evidence, based on descriptive statistics, that the gravitation of profit rates takes place only in five US industries: Manufacturing Durable Goods, Manufacturing Nondurable Goods, Wholesale trade, Retail trade and Capitalist Services. In other sectors, gravitation could not be observed because individual businesses, which might not maximize profits, dominate – as in the case of Agriculture, Construction and Individual Business Services - or because there might exist some measurement error in the capital stock and a distorting effect of economic regulation - as in the case of industries with high capital intensity. Similarly, Duménil and Lévy (2004) find descriptive evidence of gravitation of profit rates of a restricted financial sector and a restricted non-financial sector, once taking into account their large fluctuations and the effect of economic policies.

Zacharias (2001), in an interesting unpublished work, finds that profit rates of most US manufacturing industries between 1947 and 1998 are nonstationary, but not all of them are cointegrated. So it is not possible to find evidence of long-run equalization of profit rates in all the sectors considered.

Lianos and Droucopoulos (1993a) examine the behaviour of profit rate differentials of Greek manufacturing sectors between 1963 and 1986, finding a mild tendency for convergence and a slowly changing hierarchy of profit rates. Tsoulfidis and Tsaliki (2005) criticize the usage of profit margins on sales as a measure of profitability instead of the profit-capital ratio, on the ground that if the profit-capital ratios are equalized in presence of unequal capital output ratios, it will imply different profit margins. Building on the concept of "regulating capital", they find evidence of profit equalization in Greek manufacturing industries. Maldonado-Filho (1998) does not find empirical support for the hypothesis that long run profit rates are positively correlated with market power and entry barriers in the Brazilian economy from 1973 to 1985. Finally, Tsaliki and Tsoulfidis (1998) show that a classical and post-keynesian hybrid model is particularly successful when applied to large-scale Greek manufacturing industries, whereas the neoclassical model is not supported by the data.

A parallel stream of literature is the one on the persistence of profit (POP) rates which originates from the work of Brozen (1971a, b), who criticizes previous studies finding a positive relationship between industry concentration and profit rates on the basis that a cross-sectional approach, far from being able to capture long-run nexuses, might just detect temporary occurrences. Mueller (1986) moves beyond the conclusion that the correlation between concentration and profit rates is unstable, finding support for the hypothesis that profit rates tend to converge in the long-run, though the convergence process is not complete. Mueller (1990) presents a series of studies on profit dynamics concerning the US, Canada, Japan, the UK, the Federal Republic of Germany and France sharing a common methodology. It is there concluded that the persistence of company profits is much higher than what it would be possible to expect in a competitive environment.

Analyzing data on 42 Indian industries over the period 1970-1985, Kambahampati (1995) finds that profit rate differentials tend to persist more in fast growing industries or industries with high barriers to entry and that government intervention can reduce profit persistence. Lianos and Droucopoulos (1993b) detect high profit rate persistence in Greek manufacturing industries, a high permanent component of the profit rates with substantial variations among sectors; and that the concentration ratio, advertising intensity, export intensity and capital intensity of different industries do affect the speed of adjustment of profit rates. Bourlakis (1997) analyses a dataset of Greek manufacturing industries from 1958 to 1984 and he finds that the persistence of profit rate differentials is not continuous in time and that there is a general tendency towards more competitiveness.

Glen, Lee and Singh (2001, 2003) compare estimates of the persistence of profit at the company level for developing and developed countries, finding that it is greater in the latter than in the former ones and discussing possible economic causes and implications of this pattern. Yurtoglu (2004) finds that the profit persistence of major Turkish firms between 1985 and 1998 was not greater than that of firms in developed countries. A considerable degree of persistence is found by Maruyama and Odagiri (2002) analysing Japanese data in the period 1964-1997. Crespo Cuaresma and Gschwandtner (2008) produce econometric evidence in favour of changes in profit persistence through time. Gschwandtner and Hauser (2008) apply fractional integration techniques to the dynamic structure of profit rates of 156 US manufacturing firms confirming the finding of high profit persistence, which is at odd with the assumption of a competitive environment. Gschwandtner (2005) focuses on 85 US companies surviving from 1950 to 1999 and finds that profits were not eroded by competitive forces even after a period of 50 years.

Cable and Jackson (2008) use structural time series analysis finding that profit, though having a cyclical component, displayed non-eroding long run persistence in 60% of the UK companies included in their sample.

Goddard and Wilson (1999) and Gschwandtner (2003) find non-stationarity in the 76–81% of the 335 time-series of UK firms and in the 37% of the 187 US companies they consider. Crespo Cuaresma and Gschwandtner (2006) propose to explain the high persistence of profit rates on the basis of nonlinearities in their adjustment process, which could be the result of fixed costs in firms' entry-exit decisions in a market, whereby entry is attractive only if profits exceed a given level.

Goddard, McMillan and Wilson (2006) use time-series/cross-section techniques to assess the persistence of the profit rates of 96 large UK firms over a 31-years period finding that for many sectors the unit root hypothesis can be rejected though for not all of them.

Though most of the studies of the POP literature use firm level data, the specific importance of industry level analyses should not be overlooked as Duménil and Lévy (1993, p.154) show that industry profit rates equalization can take place even in presence of firms with heterogeneous technology and, therefore, profit rates. Furthermore, Tsoulfidis and Tsaliki (2005), reviewing Marx's thought, write that "The tendential equalization of price within industries implies differential profit rates between firms in the same industry. If all firms sell at the same price, it follows that firms with lower costs will tend to earn profit rates higher than those with higher costs. Thus, the tendential equalization of profit rates across industries is consistent with a hierarchy of firm rates of profit within industries. This situation would continue to exist because some of the elements of production are not easily reproducible (e.g., location, climate, natural resources) and because of unequal firm innovation." Therefore, firm level data run the risk not to be informative regarding the issue of the formation of prices of production.

3. Data and methods

Regarding average profit rates, we analyse data produced by the OECD and national statistical offices for Denmark, Finland and Italy. While for the US we rely on data published by the US Bureau of Economic Analysis.

From the OECD STAN database we consider the following variables: Labour compensation of employees (LABR), Total employment – Persons (EMPN), Employees – Persons (EMPE), Net operating surplus and mixed income (NOPS). From the national statistical offices, we obtained data on value of net capital stock at current prices (CPNK)[1]. Similarly to Duménil and Lévy (2002) and Shaikh (2008) among others, we proxy the wage equivalent of the self-employed by labour costs over total employment times the number of the self-employed. In the end, we compute the profit rate for industry *i* at time *t* (π_{it}) as follows[2]

$$\pi_{it} = \frac{NOPS_{it} - \left[\frac{LABR_{it}}{EMPE_{it}} \cdot \left(EMPN_{it} - EMPE_{it} \right) \right]}{CPNK_{it}} \tag{5}$$

Our analysis is based on the OECD STAN industry list, which builds on the ISIC Revision 3 classification[3]. Therefore, we are concerned with the following sectors: Agriculture, hunting,

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[1] The OECD STAN database contains data on real fixed capital and not on nominal fixed capital. It would be possible to deflate the numerator of (1) by the production deflator, but this would eliminate the effect on profit rates of the relative prices of production and capital goods. So a ratio between nominal variables is preferable.

[2] After Wolff (2003), note 1, we also used a Marxian definition of profit rate as

$$\frac{NOPS_{it} - \left[\frac{LABR_{it}}{EMPE_{it}} \cdot \left(EMPN_{it} - EMPE_{it} \right) \right]}{CPNK_{it} + \left[\frac{LABR_{it}}{EMPE_{it}} \cdot \left(EMPN_{it} - EMPE_{it} \right) \right] + LABR_{it} + INTI_{it}}$$

where $INTI_{it}$ is intermediate inputs. Our results did not substantially change.

[3] http://www.oecd.org/dataoecd/5/30/40729523.pdf.

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 nec; Electricity, gas and water supply; Construction; Wholesale and retail trade, restaurants and hotels; Transport and storage and communication; Finance, insurance, real estate and business services. We exclude from our analysis the public sector because the motivations underlying investment choices might be different there from the quest for the maximum possible return. The level of aggregation is determined by the necessity to match the data on the capital stock with those on profits. Our grouping of subsectors follows closely the one adopted by the OECD. In the end, for each of the 17 industries considered, we have 36 observations for Denmark, 33 for Finland and 27 for Italy.

In equation (5), profits are net of taxes and of payments for interest, as represented by financial intermediation services indirectly measured (FISIM). However, the capital stock does not include inventories, given that no data about them is provided either in the STAN database or by national statistical offices. We share this shortcoming with other studies on European countries, such as Glick and Ehrbar (1988). (5) is robust to the critique by Tsoulfidis and Tsaliki (2005) as it is a profit-capital ratio and not profit margin on sales.

In order to verify whether our results are robust to the lack of data on inventories, we also analyse US data, after Duménil and Lévy (2002). Here, we consider the following variables, taken from the Gross Product Originating, Fixed Asset and NIPA tables: Corporate Profit Before Taxes (PI), Proprietors' income (PROINC), Compensation of Employees (COMP), Full-time and Part-time Employees (FTPT), Persons engaged in Production (PEP), Full-time equivalent employees (FTE), Current-Cost Net Stock of Nonresidential and Residential Fixed Private

Capital by Industry (K), Inventories by Industry (INV). In this case we compute the profit rate of industry *i* at time *t* in the following way:

$$\pi_{it} = \frac{PI_{it} + PROINC_{it} - \frac{COMP_{it}}{FTPT_{it}}\left(PEP_{it} - FTE_{it}\right)}{K_{it} + INV_{it}} \tag{6}$$

We also check whether our results change once excluding INV from (6). Unfortunately, relying on publicly available data, it is not possible to completely rebuild the dataset by Duménil and Lévy (2002) as data on K and INV are not available any more with the SIC classification but only with the NAICS one. However, it is possible to consider 4 out of the 5 sectors that Duménil and Lévy (2002) argue whose profit rates are gravitating around a declining trend, namely Manufacturing Durable Goods, Manufacturing Nondurable Goods, Wholesale Trade and Retail Trade. For similar reasons, it is not possible to extend our dataset beyond 1997, so we have 50 observations for 4 sectors. It is worth noting that though, in principle, given the lack of data discussed above, (6) is preferable to (5), both of them are just proxies of the profit rate as their measures of the capital stock are incomplete, not including financial debts and assets and trade credits.

In our analysis of IRORs we proceed as follows. From the OECD STAN database we consider the variables: Labour compensation of employees (LABR), Total employment – Persons (EMPN), Employees – Persons (EMPE), Gross operating surplus and mixed income (GOPS) and Gross Fixed Capital Formation (GFCF). In order to proxy the wage equivalent of the self-employed we proceed as with average profit rates. In the end, similarly to Shaikh (2008), we compute profits for industry *i* at time *t* (P_{it}) as follows

$$P_{it} = GOPS_{it} - \left[\frac{LABR_{it}}{EMPE_{it}} \cdot \left(EMPN_{it} - EMPE_{it}\right)\right] \tag{7}$$

and the corresponding incremental rate of return as

$$IROR_{it} = \frac{\Delta P_{it}}{GFCF_{it-1}} \tag{8}$$

where Δ is the first difference operator.

In equation (7) as in (5), profits are net of taxes and of payments for interest, as measured by FISIM. Our analysis concerns the same sectors as for the average profits of Denmark, Finland and Italy. We consider only countries with at least 20 observations to increase our chances to capture long-term features of the data. In the end, for each of the 17 industries considered, we have 32 observations for Austria, 33 for Finland, 37 for Italy, 21 for the Netherlands and West Germany, 36 for Norway, 20 for the US.

[Figures 2 to 5 about here]

Figures 2 to 5 show the time series of industry average profit rates for Denmark, Finland, Italy and the US respectively. While for the US, profit rates generally trend downward, at a first sight no general pattern emerges for the other countries. Some industry specificities are, though, interesting. After 1998 the profitability of the Mining and Quarrying sector took off in Denmark, probably due to the increase in the price of oil in the same period, given the presence of oil reserves in the Danish portion of the North sea. It is possible to observe a similar trend in the Machinery and Equipment industry in Finland after 1993, capturing the rise of Nokia as a worldwide leader in the sector. On the other hand, the high profit rates in the Construction and in the Mining and Quarrying sectors in Italy might be the result of limitations to capital mobility. This hypothesis will be further investigated below.

Table 1, instead, shows how two measures of dispersion of the average profit rates - their standard deviation and variation coefficient - evolved through time. Considering both of them is interesting as the latter normalizes the standard deviation of the average profit rates of a given year to their mean. Therefore, it can roughly control for possible common trends that are present in the data, which might *per se* lead the standard deviation to inflate or deflate over time.

[Table 1 about here]

It is interesting to notice that the variation coefficient tends to increase towards the end of the sample in all the countries. A similar trend can be observed for the standard deviation of profit rates in Denmark and Finland, but not for Italy and the US. Therefore, it is possible to state that the dispersion of profit rates actually increased from 1948 to 1997, once depurating the data from common trends.

[Figure 6 about here]

We now move to consider descriptive evidence regarding industry IRORs. For illustrative purposes and for sake of brevity, Figure 6 focuses only on the US. However, the time-series for the other countries here considered behave in a very similar way and they are presented in Vaona (2010). As in Shaikh (2008), IRORs show a marked tendency to cross over each other, clearly more marked than the industry average profit rates showed above. Moving to the evolution of their dispersion through time, Table 2 shows that only for Italy a downward trend emerges, while in the Netherlands and in the US there appears a somewhat upward trend. In the other countries, no clear pattern shows up. In the end descriptive statistics would not clearly reject either the gravitation or the convergence hypotheses. However, we resort to econometric testing in order to provide better evidence on these issues.

[Table 2 about here]

After Mueller (1986), we consider a model for return rates with a nonlinear time trend, allowing, however, shocks to be serially correlated:

$$\tilde{x}_{it} = \alpha_i + \frac{\beta_i}{t} + \frac{\gamma_i}{t^2} + \frac{\varphi_i}{t^3} + \varepsilon_{it} \tag{9}$$

$$\varepsilon_{it} = \rho_i \varepsilon_{it-1} + \xi_{it} \tag{10}$$

where $\tilde{x}_{it}$ is the deviation of either π_{it} or $IROR_{it}$ in sector i from the cross-sectional mean, ξ_{it} is a stochastic error with a normal distribution with zero mean and variance σ_ξ^2, t is time, α_i, β_i, γ_i, φ_i, and ρ_i are parameters to be estimated.

Equation (9) was originally proposed by Mueller (1986, p. 12) in the study of long-run profit rates. It has a number of advantages against other time trend specifications. In the first place, a linear time trend is unrealistic as it would predict a continuous decline in profit rates, even after the attainment of their competitive level. In the second place, a third order polynomial in the inverse of time does not imply that the peak or the trough in profitability occurs in the first time period, allowing two changes in direction for the time-path of profitability. Higher order polynomials might incur into collinearity problems. Mueller (1986) assumed ε_{it} to be white noise, so our specification of (10) has a greater degree of generality.

In order to account for both serial correlation in the disturbance and possible cross-sector correlation we adopt a similar procedure to that proposed by Meliciani and Peracchi (2006). We first estimate (9) separately for each sector. Then we use the exactly median unbiased (EMU) estimator devised by Andrews (1993) to estimate ρ_i and its confidence interval from the residuals of (9). Building on our point estimates of ρ_i, we apply a feasible GLS transformation on our data to account for serial correlation after Greene (2003, p. 272)[4] and, finally we implement a SURE estimator on the transformed data to obtain new estimates of α_i, β_i, γ_i and φ_i.

At this stage, we test the convergence hypothesis of industry incremental rates of returns which entails

$$\alpha_i=0 \text{ and } \beta_i \text{ or } \gamma_i \text{ or } \delta_i \neq 0 \text{ for all } i \tag{11}$$

and the gravitation hypothesis which implies

$$\alpha_i=\beta_i = \gamma_i = \delta_i = 0 \text{ for all } i \tag{12}$$

We test (11) by means of a t-test, while (12) by a Wald test. The fact that we want to test whether supposedly heterogeneous parameters are different prevents us from using dynamic panel estimators, such as those based on the Generalized Method of Moments, which assume parameters' homogeneity across cross-sectional units.

If we find α_i to be significantly different from 0 for some sectors, we will interpret this as a sign of absence of convergence and gravitation given that the deviations of the return rates of these sectors from their cross-sectional mean does not tend to die completely away as time passes. Instead, if we cannot reject (11) but we can reject (12), we will interpret this as a sign of convergence as the coefficients of the time trends drive our econometric result, meaning that return rates are on time paths that tend to collapse towards their cross-sectional mean as time passes. Finally, if we cannot reject (12), we will interpret this as a sign of gravitation of return

[4] Given a generic estimate of ρ_i, $\hat{\rho}_i$, the feasible GLS transformation for a model with an AR(1) disturbance consists in pre-multiplying the vector of observations of the dependent variable and the matrix of observations of independent variables of sector *i* by the matrix below:

$$\begin{bmatrix} \sqrt{1-\hat{\rho}_i} & 0 & \cdots & 0 \\ -\hat{\rho}_i & 1 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & -\hat{\rho}_i & 1 \end{bmatrix}$$

rates as it will mean that their deviation from their cross-sectional mean can be considered as similar to those showed in Figure 1b. In case of a conflict between the tests for (11) and (12), we will consider this as a sign of model misspecification. As a consequence, if no coefficient is found to be significantly different from zero, we will decrease the order of the polynomial in (9); otherwise, we will drop insignificant regressors.

It is worth noting that resorting to Andrews (1993) is useful because the OLS estimator is well known to be downward biased in small samples (Quenouille, 1956 and Orcutt and Winokur, 1969). Given the OLS estimator of ρ_i, $\hat{\rho}_i$, whose median function is $m(\cdot)$, the EMU estimator of ρ_i is:

$$\tilde{\rho}_i = \begin{cases} 1, & if\ \hat{\rho}_i > m(1) \\ m^{-1}(\hat{\rho}_i), & if\ m(-1) < \hat{\rho}_i \leq m(1) \\ -1, & otherwise \end{cases} \tag{13}$$

where $m^{-1}(\cdot)$ is the inverse of $m(\cdot)$ and $m(-1) = \lim_{\rho_i \to -1} m(\rho_i)$. The median of $\hat{\rho}_i$ usually is numerically evaluated on a fine grid of ρ_i values and interpolation is used to obtain $m^{-1}(\cdot)$. In a similar fashion it is possible to obtain the 5th and the 95th quantiles of $\hat{\rho}_i$ and to build a 95% confidence interval of $\tilde{\rho}_i$[5].

One further methodological issue we want to tackle is how we are going to interpret our results. After Rule (1997) and Szostak (2005) we adopt an "explanation-driven" rather than a "single-

[5] An extension of this estimator to the AR(p) case, with p being the number of lags, is provided in Andrews and Chen (1994). The EMU estimator requires prior knowledge on the distribution of ξ_{it}, however Andrews (1993) showed that assuming it to be normal produces results robust to various non-normal distributions. One further assumption is $m(\cdot)$ to be continuous and strictly increasing. It is worth noting that in the empirical application by Meliciani and Peracchi (2006) not resorting to the EMU estimator increases the frequency of rejection of the null hypothesis of equality of parameters across cross-sectional units.

theory-driven" approach. The latter one considers only evidence and arguments within the scope of a particular theory or a closely related family of theories. The former one, instead, is open to all evidence and arguments. Therefore, once facing our results, we will ask ourselves what their explanation might be, considering theories and evidence produced by scholars not necessarily belonging to a given school of thought. The advantages of an "explanation-driven" approach over a "single-theory-driven" approach are that its validity is not challenged by the passing out of vogue of a particular theory and it does not pose any *a priori* constraint on the evidence to be considered.

4. Results and interpretation

Our results for average profits in Denmark, Finland, Italy and the US are set out in Tables 3 to 7. For most of the sectors considered, but Agriculture, hunting, forestry and fishing in Denmark, Food products, beverages and tobacco in Finland and Wood and products of wood and cork and Manufacturing n.e.c. in Italy, we find that serial correlation in the disturbances is statistically significant at a 5% level. However, we do not find evidence supporting the presence of unit roots in the residuals with the exception of Finance, insurance, real estate and business services in Finland. As a matter of consequence, this sector was excluded from the SURE estimation.

[Tables 3 to 7 about here]

Parameter estimates, together with their statistical significance, differ considerably across sectors and not surprisingly econometric tests for (12), set out in Table 7, strongly reject the null hypothesis in all the countries considered. The null hypothesis of eventual convergence of profit rates, (11), was rejected too.

In principle, it would be possible to think that restricting the analysis to manufacturing industries might provide more favourable results to the gravitation hypothesis, or at least to the convergence one. This is because after Duménil and Lévy (2002) one might argue that the capital stocks of the Financial intermediation and Wholesale trade sectors are not accurately measured due to the lack of data on financial debts and assets and on inventories respectively. Further, Agricultural and Construction activities might have a too large share of individual businesses, which might not respond to profit rate differentials due to either lack of information or absence of a profit maximizing behaviour. Finally, the capital stock in Mining, Transport and Electricity activities might not be properly measured due to its long duration. However, even the null hypotheses of a gravitation or convergence field restricted to the manufacturing sector could not be accepted[6].

We conclude that industry average profit rates were not gravitating around a common value during the period of observation, instead they were each converging towards an idiosyncratic path. With the exception of the financial sector in Finland, whose profit rate would appear to contain a stochastic trend.

[Tables 8 and 9 about here]

Our econometric results regarding IRORs are set out in Tables 8 and 9. Once again for sake of brevity, Table 8 shows our estimates of (9) and (10) for the US only. Results for the other

[6] The SURE estimates obtained restricting the analysis to manufacturing activities are similar to those set out in Tables 3 to 6. Excluding from the sample the Machinery and Equipment sector in Finland would not alter our results to a significant extent.

countries included in our sample are similar to those set out in Vaona (2010)[7]. We repeat the robustness check of focusing only on manufacturing sectors for IRORs as well.

A common result to all the countries considered is the absence of high serial correlation in the residuals as the there is no trace of unit roots in them. Signs of model misspecification show up in some of the sectors considered. Therefore (9) had to be re-specified as described above. Table 9 show the results obtained once testing for (11) and (12). Lack of either convergence or gravitation was found in all the countries but West Germany, where IRORs would appear to be on converging trends.

Focusing only on manufacturing sectors would increase the evidence in favour of the tendential equalization of IRORs, but lack of either convergence or gravitation still shows up in at least one sector in Austria and the US. In Finland and Norway, IRORs were gravitating around their cross-sectional means, while in the other countries they were on converging trends.

We interpret the outcome above as the consequence of limitations to capital mobility across sectors, which might have different sources. In the first place, it might be that the costs of adjustment to best practice methods of production are so high that capitals are locked in past techniques, as argued by the proponents of IROR as a measure of profit rate. This view finds some support by the fact that in many of the countries considered above the hypothesis of tendential equalization of sectoral IRORs, in the form of either gravitation or convergence, cannot be rejected by econometric tests once focusing only on manufacturing industries.

However, given that this pattern does not emerge for all the countries analysed, it is necessary to consider further possible explanations too. A second source of lack of equalization among return rates might be that investors do not have full information about investment opportunities in all the sectors as hypothesized by Duménil and Lévy (1993). Furthermore, if we consider the two

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7 They are available from the author upon request.

processes mentioned by Duménil and Lévy (1993) as underlying capital mobility, namely firms' entry and exit decisions and credit flows, it is well known that they are not as smooth as one in principle could expect. On the one hand, sunk costs and uncertainty are known to curb firms' movements in and out a given market (Dixit, 1989; Cabral, 1995; Lambson, 1991 and 1992). In this context the persistent ability of firms in a given industry to undertake strategic investment leading to innovation or to increase their market share might boost the industrial relative profit rate for a long period of time (Lee and Mahmood, 2009, Pianta and Tancioni, 2008, Geroski et al. 1993, Dosi, 2007). The dynamics of the profit rate of the Machinery and Equipment industry in Finland can be taken as an example of this case. On the other, capital market imperfections are a pervasive phenomenon, whereby, for instance, the structure of a given industry in terms of firm size might curb capital mobility given that small firms tend to have less collateral and, therefore, less creditworthiness (Schiantarelli, 1996).

Duménil and Lévy (1993, p.155) showed by means of numerical simulations that limitations to capital mobility can produce highly persistent deviations in industry profit rates. Inspecting their results it is possible to infer that, observing industry profit rates for periods of 20-50 years, one might find a pattern very similar to the one emerged in the present work, namely that profit rates do not seem to gravitate and they appear to follow trends which might or might not converge. Under this perspective, the results contained in the present work might not be considered *per se* as an empirical challenge to the theory of the equalization of profit rates and, as a consequence, of the relevance of the prices of production. It would be necessary to have data for a much longer time span than that usually considered in the literature to observe the gravitation of profit rates, which, in its own, could be considered as only one of the forces that affect the dynamics of industry return rates. Adjustment and sunk costs, uncertainty, lack of information, capital market imperfections and innovation trajectories are very likely to have a role as well.

5. Conclusions and policy implications

This work has investigated by means of descriptive statistics and econometric testing robust to cross-sectional and serial correlation whether industry return rates displayed either gravitation around or convergence towards a common value in various OECD countries for different time periods. We found that industry return rates did not tend to gravitate around or converge towards a common value in all the countries considered. This lack of tendential equalization can be explained in part as the result of costs in the adjustment towards best practice production methods. However, other explanations should be considered too, such as investors' lack of information, an uneven distribution of the abilities of firms across economic industries to innovate and increase their market share and, finally, structural differences across sectors affecting their ability to attract credit flows.

These four kinds of limitations to capital mobility point to four possible directions for policy interventions. In the first place, if policy makers were able to quantify adjustment costs to adopt best practice methods of production and supposing they were free from lobbying pressures, it might be desirable to subsidize those sectors where such costs are higher so that the diffusion of best practice production methods can proceed faster. In the second place, it could be beneficial to create institutions able to spread information regarding profitable opportunities to agents not acquainted with the dynamics of given economic industries, in order to remove possible information obstacles to arbitrageurs. This result could also be obtained by favouring the inflow of credit into more profitable sectors, if this was hampered by structural factors, such as the inability of small firms to offer some collateral. Finally, when industrial return rates vary due to different innovative performances, it might be the case that sectoral systems of innovation are working well in some industries and less well in others. In other words, the evolving interaction of actors and their networks with ever-changing, sector specific institutions, knowledge bases, technologies and inputs might produce different economic outcomes (Malerba, 2005). Under such circumstances, comparisons of under-performing and over-performing sectoral systems of innovation can lead to policy recommendations able to take into account the specificities of each industry.

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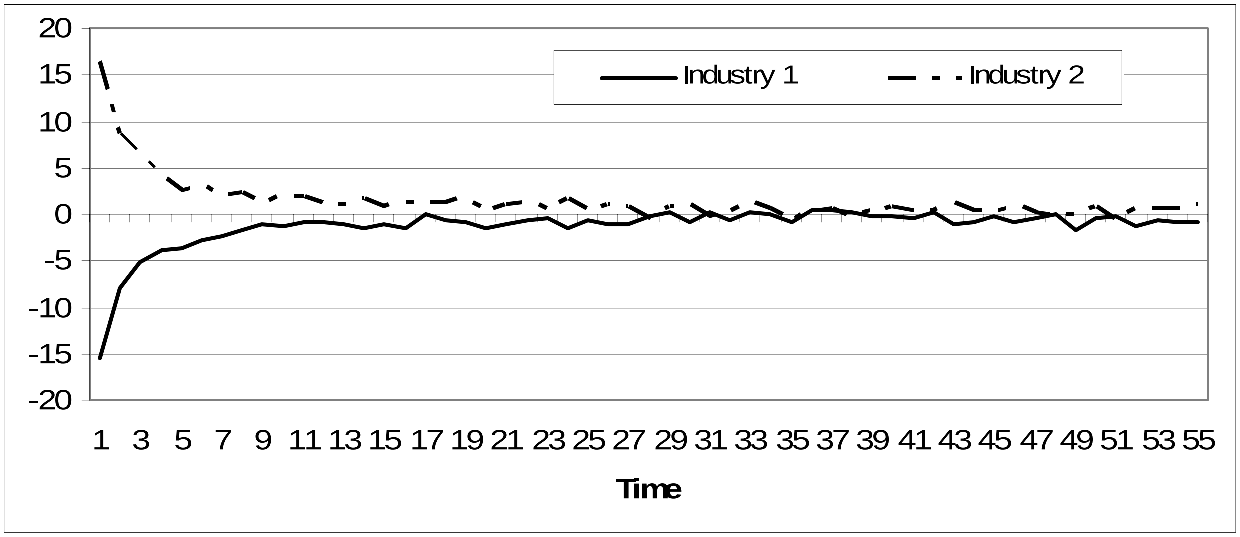
Figure 1 – Convergence and gravitation of simulated sectoral return rates

a) Deviations from the sectoral average return rate under the convergence hypothesis



b) Deviations from the sectoral average return rate under the gravitation hypothesis

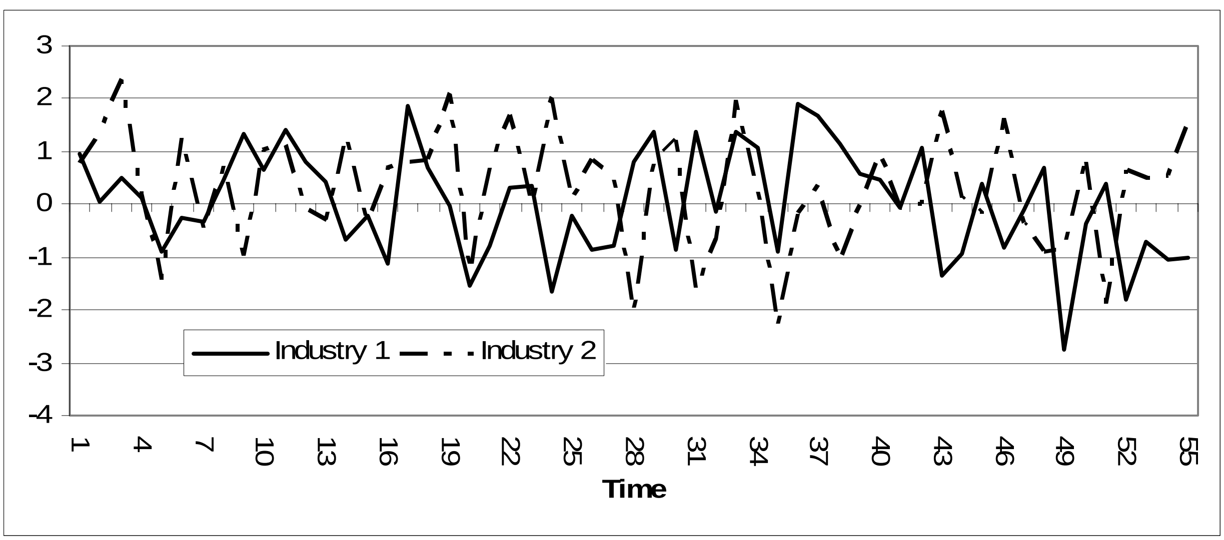
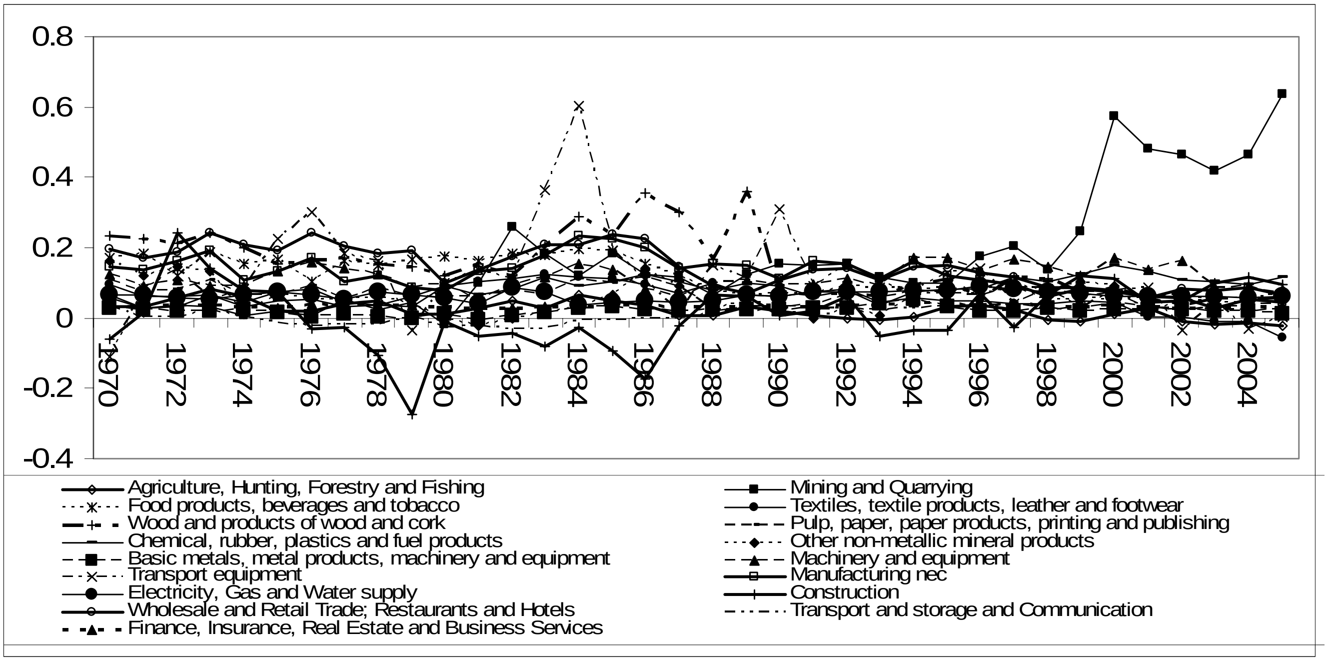
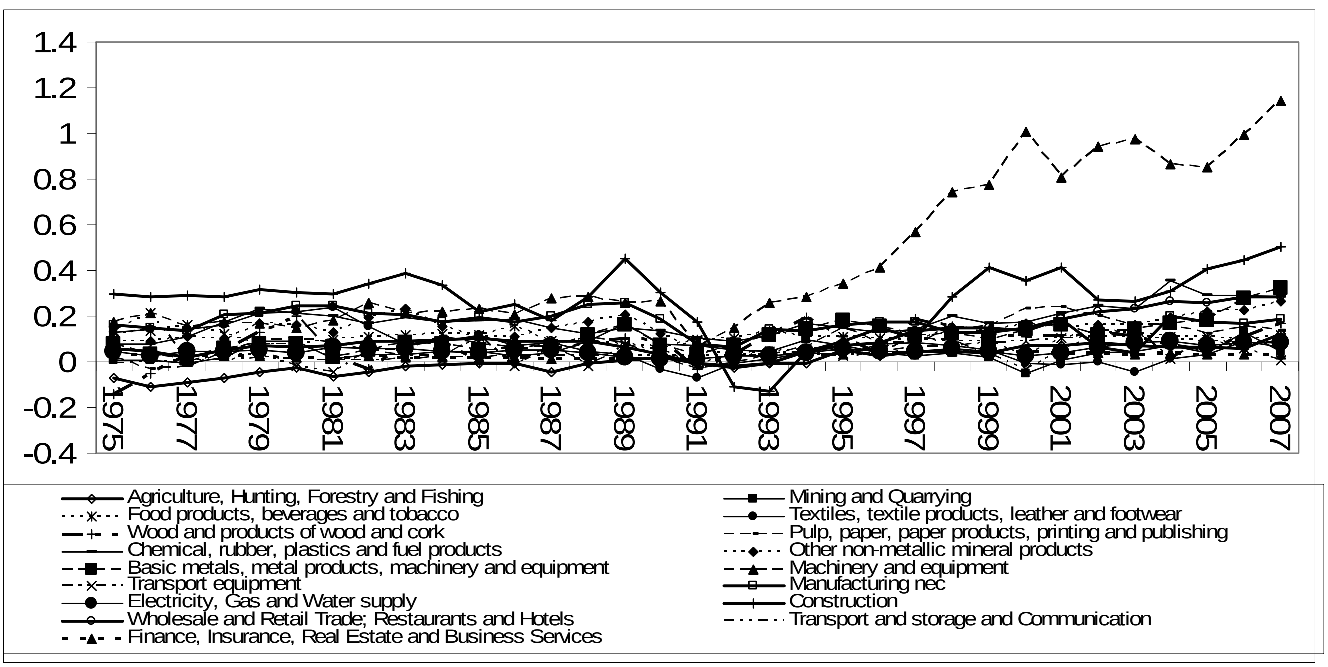


Figure 2 - Industry average profit rates in Denmark, 1970-2005



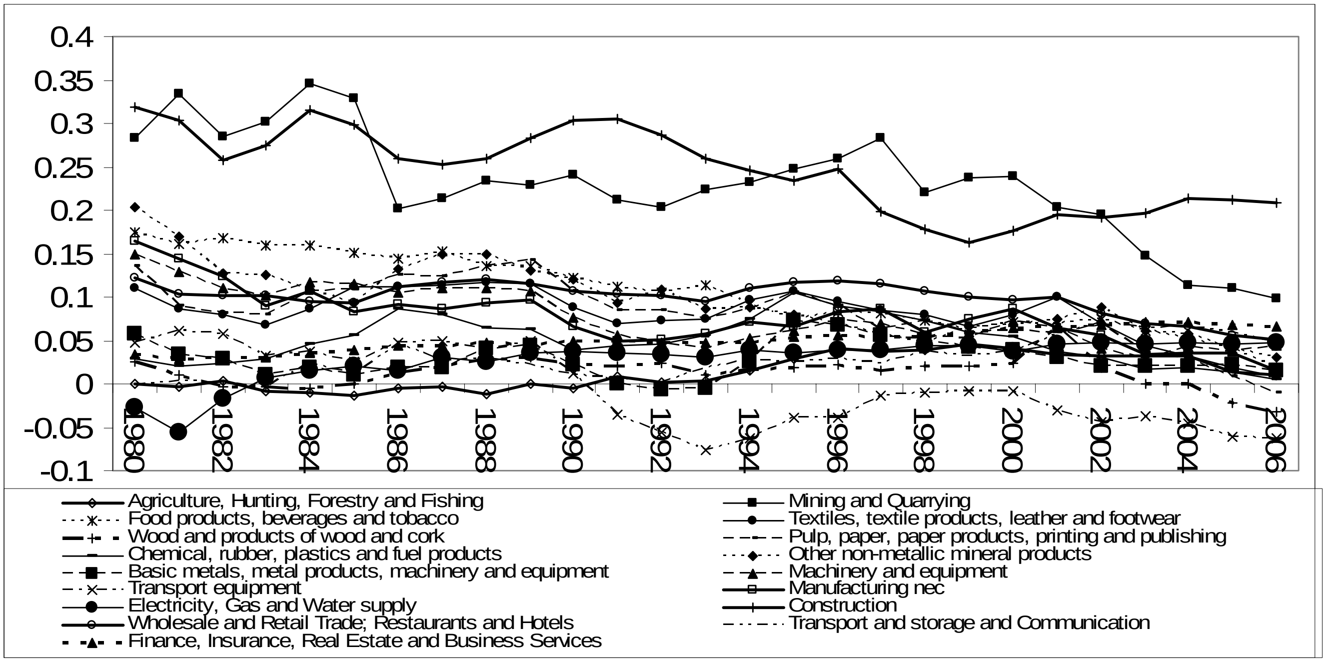
Source: author's elaboration on OECD and national data.

Figure 3 - Industry average profit rates in Finland, 1975-2007



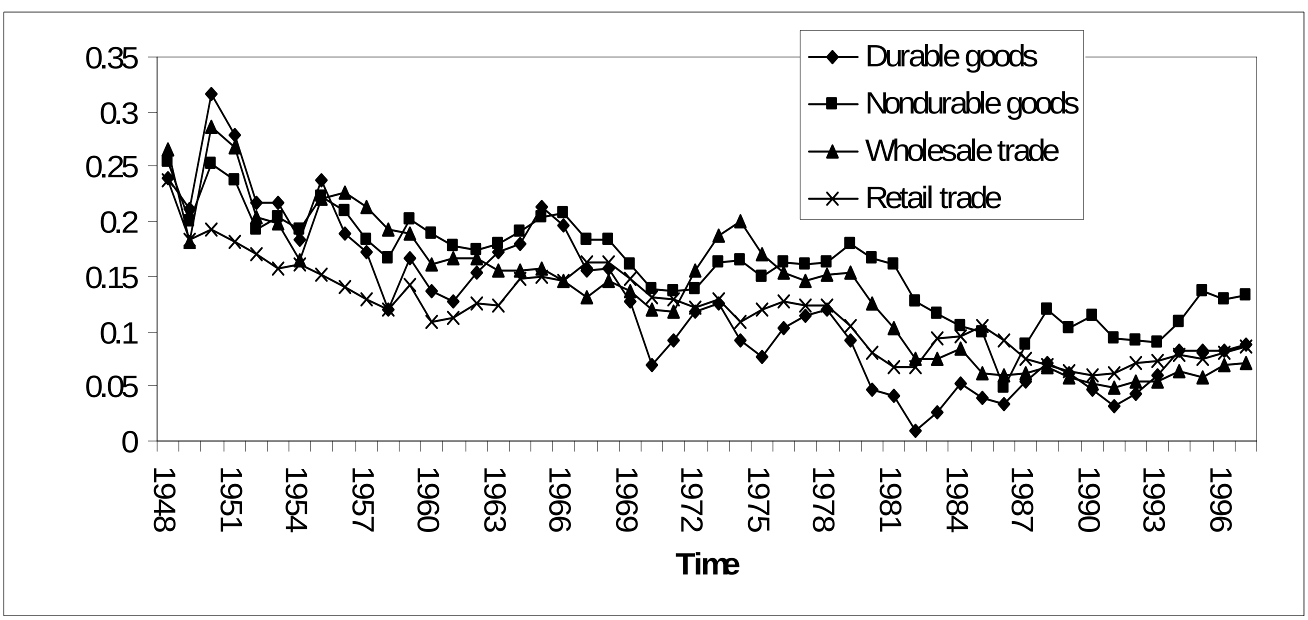
Source: author's elaboration on OECD and national data.

Figure 4 - Industry average profit rates in Italy, 1980-2006



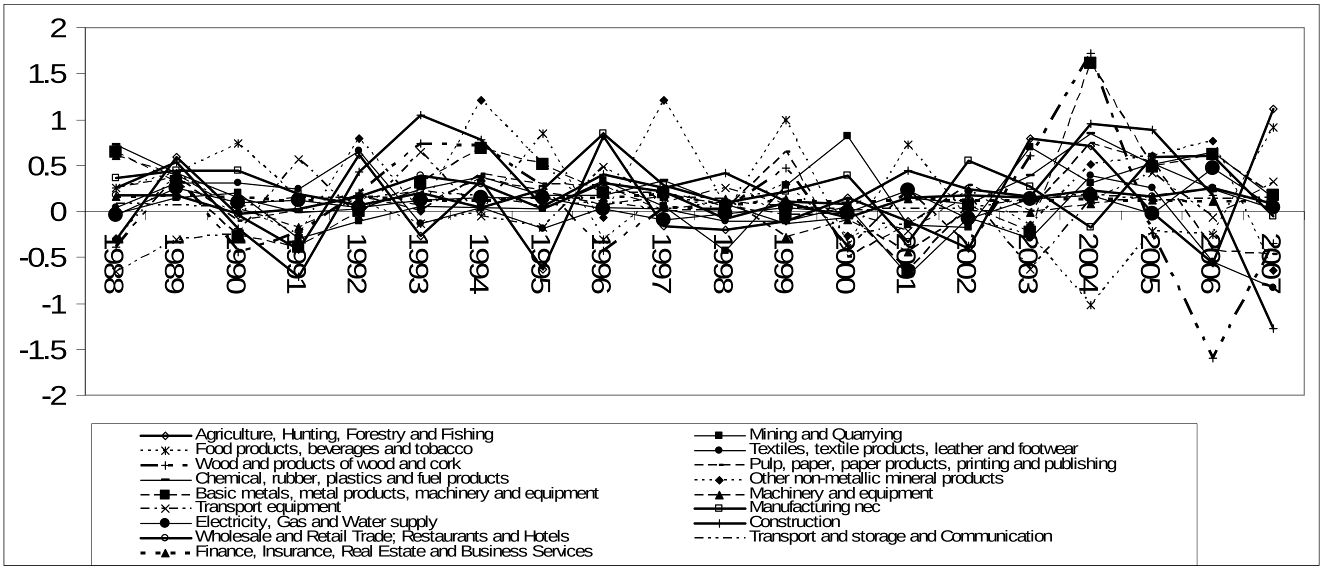
Source: author's elaboration on OECD and national data.

Figure 5 – Industry average profit rates for selected industries in the US, 1948-1997



Source: author's elaboration on data from the Bureau for Economic Analysis

Figure 6 - Sectoral incremental rates of return on capital (IRORs) in the US, 1988-2007



Source: author's elaboration on OECD and national data.

Table 1 – Standard deviation and variation coefficient of industry average profit rates in Denmark, Finland, Italy and the US

Denmark			Finland			Italy			US		
Year	Standard deviation	Variation coefficient	Year	Standard deviation	Variation coefficient	Year	Standard deviation	Variation coefficient	Year	Standard deviation	Variation coefficient
1970	0.09	1.11	1975	0.10	1.41	1980	0.10	0.94	1948	0.01	0.05
1971	0.07	0.81	1976	0.10	1.41	1981	0.11	1.11	1949	0.01	0.07
1972	0.07	0.71	1977	0.09	1.37	1982	0.09	1.03	1950	0.05	0.20
1973	0.07	0.71	1978	0.09	1.01	1983	0.09	1.13	1951	0.04	0.18
1974	0.06	0.84	1979	0.09	0.81	1984	0.10	1.08	1952	0.02	0.10
1975	0.07	0.78	1980	0.10	0.86	1985	0.10	1.07	1953	0.03	0.13
1976	0.09	1.05	1981	0.11	1.13	1986	0.07	0.77	1954	0.02	0.09
1977	0.07	0.94	1982	0.11	1.04	1987	0.07	0.77	1955	0.04	0.18
1978	0.07	1.08	1983	0.10	0.95	1988	0.07	0.78	1956	0.04	0.20
1979	0.10	2.35	1984	0.09	0.84	1989	0.07	0.77	1957	0.03	0.20
1980	0.06	1.02	1985	0.08	0.79	1990	0.08	0.99	1958	0.04	0.24
1981	0.07	1.04	1986	0.08	0.96	1991	0.08	1.15	1959	0.03	0.15
1982	0.08	0.94	1987	0.08	0.83	1992	0.08	1.20	1960	0.03	0.23
1983	0.11	1.02	1988	0.09	0.90	1993	0.08	1.23	1961	0.03	0.21
1984	0.15	1.11	1989	0.12	0.93	1994	0.07	1.01	1962	0.02	0.14
1985	0.09	0.86	1990	0.09	1.08	1995	0.07	0.87	1963	0.02	0.16
1986	0.11	1.12	1991	0.06	1.83	1996	0.07	0.88	1964	0.02	0.12
1987	0.08	0.99	1992	0.06	1.86	1997	0.07	0.89	1965	0.03	0.18
1988	0.05	0.69	1993	0.08	1.40	1998	0.06	0.78	1966	0.03	0.19
1989	0.08	0.93	1994	0.07	0.83	1999	0.06	0.81	1967	0.02	0.14
1990	0.07	0.92	1995	0.08	0.78	2000	0.06	0.79	1968	0.02	0.10
1991	0.05	0.73	1996	0.09	0.94	2001	0.06	0.77	1969	0.01	0.10
1992	0.05	0.62	1997	0.12	0.99	2002	0.06	0.88	1970	0.03	0.27
1993	0.05	0.83	1998	0.16	1.09	2003	0.05	1.02	1971	0.02	0.16
1994	0.05	0.70	1999	0.18	1.23	2004	0.05	1.08	1972	0.02	0.13
1995	0.05	0.65	2000	0.24	1.55	2005	0.06	1.41	1973	0.03	0.19
1996	0.04	0.54	2001	0.19	1.14	2006	0.06	1.77	1974	0.05	0.36
1997	0.06	0.71	2002	0.21	1.23				1975	0.04	0.31
1998	0.04	0.57	2003	0.22	1.30				1976	0.03	0.20
1999	0.06	0.77	2004	0.20	1.12				1977	0.02	0.15
2000	0.13	1.23	2005	0.20	1.11				1978	0.02	0.15
2001	0.11	1.40	2006	0.23	1.09				1979	0.04	0.31
2002	0.11	1.56	2007	0.27	1.19				1980	0.05	0.50
2003	0.10	1.42							1981	0.05	0.56
2004	0.11	1.57							1982	0.05	0.69
2005	0.15	1.93							1983	0.04	0.49
									1984	0.02	0.27
									1985	0.03	0.40
									1986	0.02	0.43
									1987	0.01	0.21
									1988	0.03	0.31
									1989	0.02	0.29
									1990	0.03	0.46
									1991	0.03	0.44
									1992	0.02	0.32
									1993	0.02	0.23
									1994	0.02	0.22
									1995	0.03	0.39
									1996	0.03	0.30
									1997	0.03	0.28

Table 2 – Standard deviation and variation coefficient of industry incremental rates of return (IRORs) in Austria, Finland, Italy and the Netherlands, Norway, the US and West Germany

Austria			Finland			Italy			The Netherlands			Norway			US			West Germany		
Year	Standard deviation	Variation coefficient	Year	Standard deviation	Variation coefficient	Year	Standard deviation	Variation coefficient	Year	Standard deviation	Variation coefficient	Year	Standard deviation	Variation coefficient	Year	Standard deviation	Variation coefficient	Year	Standard deviation	Variation coefficient
1977	0.33	8.56	1976	0.32	2.22	1971	0.15	-4.78	1988	0.38	2.25	1971	0.21	4.77	1988	0.39	6.40	1971	0.23	2.57
1978	0.22	-50.23	1977	0.51	2.79	1972	0.20	2.44	1989	0.28	0.93	1972	0.27	1.37	1989	0.19	0.71	1972	0.18	2.47
1979	0.36	1.57	1978	0.48	1.06	1973	0.33	0.80	1990	0.35	3.71	1973	0.51	2.29	1990	0.31	18.30	1973	0.18	1.63
1980	0.37	2.32	1979	0.48	0.81	1974	0.46	0.89	1991	0.39	50.50	1974	0.51	1.73	1991	0.31	-5.21	1974	0.40	6.16
1981	0.24	3.63	1980	0.38	1.28	1975	0.41	-17.78	1992	0.25	-2.15	1975	0.37	5.50	1992	0.25	1.36	1975	0.41	67.70
1982	0.20	1.65	1981	0.51	18.17	1976	0.40	0.76	1993	0.20	6.70	1976	0.27	9.49	1993	0.27	1.77	1976	0.28	1.44
1983	0.31	1.49	1982	0.54	1.98	1977	0.21	1.02	1994	0.26	1.28	1977	0.42	3.54	1994	0.34	1.02	1977	0.31	2.28
1984	0.28	29.48	1983	0.44	1.64	1978	0.19	0.70	1995	0.27	1.70	1978	0.41	7.45	1995	0.34	2.42	1978	0.20	1.50
1985	0.38	2.41	1984	0.24	1.72	1979	0.38	0.82	1996	0.26	2.92	1979	0.71	2.11	1996	0.32	1.72	1979	0.28	3.27
1986	0.49	-20.72	1985	0.53	11.22	1980	0.40	0.72	1997	0.33	2.25	1980	0.98	-30.35	1997	0.31	1.77	1980	0.19	-13.23
1987	0.38	-114.36	1986	0.41	32.13	1981	0.36	1.37	1998	0.45	2.30	1981	0.51	4.37	1998	0.16	10.32	1981	0.21	13.29
1988	0.27	1.67	1987	0.48	2.05	1982	0.14	0.71	1999	0.29	2.97	1982	0.55	3.44	1999	0.31	1.97	1982	0.24	3.68
1989	0.24	1.92	1988	0.54	2.59	1983	0.22	1.24	2000	0.62	2.15	1983	0.48	3.73	2000	0.30	-9.37	1983	0.23	1.67
1990	0.14	0.90	1989	0.72	1.17	1984	0.27	0.71	2001	0.58	3.51	1984	0.54	1.67	2001	0.37	-5.74	1984	0.15	2.00
1991	0.22	3.39	1990	0.34	-1.84	1985	0.15	0.88	2002	0.45	-6.14	1985	0.60	4.82	2002	0.25	4.66	1985	0.19	1.40
1992	0.20	-13.06	1991	0.48	-1.09	1986	0.43	2.66	2003	0.38	7.92	1986	0.37	244.92	2003	0.38	4.08	1986	0.27	1.42
1993	0.17	-1.41	1992	0.78	7.07	1987	0.13	0.75	2004	0.41	10.99	1987	0.27	-35.94	2004	0.64	1.52	1987	0.28	-14.51
1994	0.22	4.48	1993	0.49	1.13	1988	0.16	0.87	2005	0.33	0.91	1988	0.51	2.76	2005	0.32	1.23	1988	0.19	1.39
1995	0.34	1.39	1994	1.56	2.40	1989	0.10	0.59	2006	0.59	1.42	1989	0.31	4.42	2006	0.58	19.90	1989	0.21	1.40
1996	0.45	2.25	1995	0.57	2.60	1990	0.19	6.81	2007	0.37	1.43	1990	0.76	-14.85	2007	0.63	-10.78	1990	0.36	2.66
1997	0.27	2.38	1996	0.42	-15.12	1991	0.16	6.53	2008	1.01	7.19	1991	1.61	4.17				1991	0.15	1.84
1998	0.37	-23.45	1997	0.70	1.79	1992	0.09	1.48				1992	0.47	2.96						
1999	0.24	1.45	1998	0.50	1.85	1993	0.14	2.74				1993	0.79	2.04						
2000	0.40	1.67	1999	0.36	35.33	1994	0.18	0.84				1994	1.25	2.54						
2001	0.27	10.21	2000	0.69	11.88	1995	0.20	0.85				1995	0.71	1.96						
2002	0.16	5.45	2001	0.47	1.79	1996	0.12	1.07				1996	0.42	9.58						
2003	0.51	-82.48	2002	0.50	-3777.35	1997	0.15	4.60				1997	0.31	1.99						
2004	0.24	0.86	2003	0.31	-3.17	1998	0.16	-28.57				1998	0.36	41.29						
2005	0.22	1.28	2004	0.84	9.55	1999	0.11	2.26				1999	0.34	15.76						
2006	0.25	1.02	2005	0.49	4.96	2000	0.10	0.84				2000	0.74	2.30						
2007	0.34	1.39	2006	0.42	1.18	2001	0.20	2.53				2001	0.99	2.27						
2008	0.50	5.34	2007	0.44	1.24	2002	0.18	-50.17				2002	0.51	-6.55						
			2008	0.56	-2.37	2003	0.15	-2.08				2003	0.26	1.76						
						2004	0.09	2.32				2004	0.47	1.15						
						2005	0.09	-2.39				2005	0.56	1.45						
						2006	0.09	2.03				2006	0.34	0.79						
						2007	0.08	0.94												
						2008	0.18	-6.41												

Table 3 – Heterogeneous non-linear time trends in industry average profit rates in Denmark, 1970-2005

Estimation method: SURE on transformed data to account for first order serial correlation

	Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]	
Agriculture, Hunting, Forestry and Fishing						
α	-0.084	0.007	-11.610	0.000	-0.098	-0.070
β	0.430	0.123	3.510	0.000	0.190	0.671
γ	-1.056	0.379	-2.790	0.005	-1.798	-0.314
φ	0.663	0.269	2.460	0.014	0.135	1.191
ρ	0.259	-	-	-	0.504	-0.004
R^2			0.900			
Mining and Quarrying						
α	0.334	0.111	3.020	0.003	0.117	0.551
β	-3.296	1.215	-2.710	0.007	-5.678	-0.914
γ	7.273	2.640	2.760	0.006	2.100	12.447
φ	-4.319	1.615	-2.670	0.007	-7.484	-1.154
ρ	0.843	-	-	-	0.926	0.613
R^2			0.161			
Food products, beverages and tobacco						
α	-0.004	0.020	-0.200	0.844	-0.042	0.035
β	0.540	0.322	1.680	0.094	-0.091	1.171
γ	-0.817	0.916	-0.890	0.373	-2.613	0.979
φ	0.375	0.623	0.600	0.547	-0.846	1.597
ρ	0.502	-	-	-	0.681	0.240
R^2			0.411			
Textiles, textile products, leather and footwear						
α	-0.050	0.027	-1.840	0.065	-0.103	0.003
β	0.273	0.363	0.750	0.452	-0.439	0.985
γ	-0.552	0.883	-0.630	0.531	-2.283	1.178
φ	0.352	0.562	0.630	0.530	-0.748	1.453
ρ	0.792	-	-	-	0.912	0.567
R^2			0.151			

	Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]	
Wood and products of wood and cork						
α	0.003	0.041	0.060	0.949	-0.077	0.082
β	1.074	0.674	1.590	0.111	-0.246	2.395
γ	-2.354	1.937	-1.220	0.224	-6.150	1.442
φ	1.423	1.322	1.080	0.282	-1.169	4.014
ρ	0.495	-	-	-	0.702	0.251
R^2			0.324			
Pulp, paper, paper products, printing and publishing						
α	-0.030	0.014	-2.060	0.040	-0.058	-0.001
β	0.206	0.229	0.900	0.366	-0.242	0.654
γ	-0.494	0.623	-0.790	0.428	-1.716	0.728
φ	0.346	0.416	0.830	0.406	-0.470	1.161
ρ	0.600	-	-	-	0.776	0.333
R^2			0.223			
Chemical, rubber, plastics and fuel products						
α	0.049	0.010	4.680	0.000	0.028	0.069
β	-0.775	0.174	-4.440	0.000	-1.117	-0.433
γ	1.628	0.510	3.190	0.001	0.628	2.627
φ	-0.924	0.351	-2.630	0.008	-1.612	-0.236
ρ	0.436	-	-	-	0.639	0.144
R^2			0.474			
Other non-metallic mineral products						
α	-0.031	0.020	-1.550	0.120	-0.070	0.008
β	0.034	0.329	0.100	0.918	-0.611	0.679
γ	0.349	0.941	0.370	0.710	-1.494	2.193
φ	-0.273	0.641	-0.430	0.670	-1.530	0.984
ρ	0.491	-	-	-	0.671	0.208
R^2			0.267			

continues

Table 3 – Heterogeneous non-linear time trends in industry average profit rates in Denmark, 1970-2005

Estimation method: SURE on transformed data to account for first order serial correlation

continued

	Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]	
Basic metals, metal products, machinery and equipment						
α	-0.039	0.010	-4.080	0.000	-0.057	-0.020
β	-0.421	0.149	-2.840	0.005	-0.713	-0.130
γ	1.156	0.419	2.760	0.006	0.335	1.977
φ	-0.747	0.286	-2.610	0.009	-1.307	-0.187
ρ	0.517	-	-	-	0.716	0.226
R^2			0.810			
Machinery and equipment						
α	0.048	0.020	2.340	0.019	0.008	0.088
β	-0.252	0.328	-0.770	0.442	-0.895	0.391
γ	0.492	0.903	0.540	0.586	-1.278	2.262
φ	-0.240	0.604	-0.400	0.691	-1.425	0.944
ρ	0.589	-	-	-	0.760	0.254
R^2			0.266			
Transport equipment						
α	-0.008	0.047	-0.170	0.865	-0.099	0.083
β	1.079	0.730	1.480	0.139	-0.351	2.510
γ	-3.227	2.221	-1.450	0.146	-7.580	1.125
φ	1.951	1.583	1.230	0.218	-1.151	5.054
ρ	0.351	-	-	-	0.596	0.059
R^2			0.184			
Manufacturing nec						
α	0.001	0.029	0.040	0.968	-0.056	0.059
β	0.666	0.423	1.580	0.115	-0.163	1.495
γ	-1.644	1.065	-1.540	0.123	-3.732	0.444
φ	1.039	0.687	1.510	0.130	-0.307	2.386
ρ	0.744	-	-	-	0.888	0.454
R^2			0.179			
Electricity, Gas and Water supply						
α	0.005	0.015	0.350	0.725	-0.024	0.034
β	-0.428	0.223	-1.920	0.054	-0.865	0.008
γ	1.209	0.589	2.050	0.040	0.054	2.364
φ	-0.798	0.390	-2.040	0.041	-1.563	-0.033
ρ	0.613	-	-	-	0.779	0.321
R^2			0.131			

	Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]	
Construction						
α	-0.093	0.048	-1.950	0.051	-0.186	0.001
β	0.496	0.792	0.630	0.532	-1.057	2.049
γ	-1.204	2.303	-0.520	0.601	-5.717	3.309
φ	0.653	1.583	0.410	0.680	-2.449	3.756
ρ	0.444	-	-	-	0.650	0.140
R^2			0.232			
Wholesale and Retail Trade; Restaurants and Hotels						
α	-0.004	0.018	-0.220	0.825	-0.038	0.030
β	1.198	0.292	4.100	0.000	0.625	1.771
γ	-2.954	0.858	-3.440	0.001	-4.636	-1.272
φ	1.878	0.594	3.160	0.002	0.715	3.041
ρ	0.420	-	-	-	0.642	0.150
R^2			0.701			
Transport and storage and Communication						
α	-0.036	0.017	-2.040	0.041	-0.070	-0.001
β	-0.569	0.231	-2.460	0.014	-1.021	-0.117
γ	1.363	0.550	2.480	0.013	0.285	2.441
φ	-0.811	0.348	-2.330	0.020	-1.494	-0.128
ρ	0.752	-	-	-	0.866	0.504
R^2			0.568			
Finance, Insurance, Real Estate and Business Services						
α	-0.034	0.011	-3.220	0.001	-0.055	-0.013
β	-0.247	0.153	-1.620	0.106	-0.546	0.052
γ	0.679	0.396	1.710	0.087	-0.098	1.456
φ	-0.446	0.262	-1.700	0.088	-0.959	0.067
ρ	0.634	-	-	-	0.782	0.299
R^2			0.650			

Table 4 – Heterogeneous non-linear time trends in industry average profit rates in Finland, 1975-2007

Estimation method: SURE on transformed data to account for first order serial correlation

	Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]	
Agriculture, Hunting, Forestry and Fishing						
α	-0.082	0.015	-5.590	0.000	-0.110	-0.053
β	-0.368	0.225	-1.640	0.102	-0.809	0.073
γ	0.356	0.642	0.550	0.579	-0.902	1.614
φ	-0.051	0.436	-0.120	0.907	-0.906	0.804
ρ	0.563	-	-	-	0.755	0.288
R^2			0.874			
Mining and Quarrying						
α	-0.095	0.045	-2.110	0.035	-0.183	-0.007
β	0.338	0.587	0.580	0.564	-0.812	1.489
γ	-0.951	1.438	-0.660	0.508	-3.770	1.868
φ	0.629	0.919	0.680	0.494	-1.172	2.429
ρ	0.779	-	-	-	0.894	0.491
R^2			0.224			
Food products, beverages and tobacco						
α	-0.088	0.035	-2.500	0.012	-0.157	-0.019
β	1.098	0.475	2.310	0.021	0.166	2.030
γ	-2.271	1.231	-1.840	0.065	-4.685	0.142
φ	1.322	0.806	1.640	0.101	-0.257	2.902
ρ	0.740	-	-	-	0.864	0.443
R^2			0.145			
Textiles, textile products, leather and footwear						
α	-0.200	0.029	-6.830	0.000	-0.257	-0.142
β	2.386	0.446	5.350	0.000	1.512	3.260
γ	-5.291	1.215	-4.360	0.000	-7.672	-2.911
φ	3.161	0.811	3.900	0.000	1.572	4.750
ρ	0.584	-	-	-	0.777	0.296
R^2			0.589			

	Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]	
Wood and products of wood and cork						
α	-0.058	0.033	-1.770	0.077	-0.123	0.006
β	0.613	0.526	1.160	0.244	-0.419	1.645
γ	-2.302	1.533	-1.500	0.133	-5.308	0.703
φ	1.527	1.054	1.450	0.148	-0.540	3.594
ρ	0.460	-	-	-	0.648	0.170
R^2			0.358			
Pulp, paper, paper products, printing and publishing						
α	-0.018	0.027	-0.680	0.494	-0.071	0.034
β	-0.040	0.408	-0.100	0.923	-0.839	0.760
γ	-0.493	1.092	-0.450	0.651	-2.633	1.646
φ	0.500	0.721	0.690	0.488	-0.914	1.915
ρ	0.628	-	-	-	0.801	0.357
R^2			0.233			
Chemical, rubber, plastics and fuel products						
α	0.047	0.019	2.400	0.016	0.009	0.085
β	0.395	0.308	1.280	0.199	-0.208	0.998
γ	-1.454	0.881	-1.650	0.099	-3.180	0.272
φ	1.021	0.600	1.700	0.089	-0.156	2.197
ρ	0.513	-	-	-	0.693	0.236
R^2			0.582			
Other non-metallic mineral products						
α	0.003	0.024	0.110	0.909	-0.045	0.051
β	0.350	0.357	0.980	0.326	-0.349	1.050
γ	-0.939	0.942	-1.000	0.319	-2.786	0.908
φ	0.606	0.620	0.980	0.328	-0.608	1.821
ρ	0.680	-	-	-	0.815	0.378
R^2			0.121			

continues

Table 4 – Heterogeneous non-linear time trends in industry average profit rates in Finland, 1975-2007

Estimation method: SURE on transformed data to account for first order serial correlation

continued

	Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]	
Basic metals, metal products, machinery and equipment						
α	0.057	0.030	1.900	0.057	-0.002	0.117
β	-0.904	0.423	-2.140	0.032	-1.732	-0.076
γ	1.928	1.081	1.780	0.074	-0.191	4.046
φ	-1.079	0.701	-1.540	0.124	-2.454	0.295
ρ	0.736	-	-	-	0.882	0.470
R^2			0.125			
Machinery and equipment						
α	0.691	0.156	4.420	0.000	0.385	0.997
β	-4.734	1.626	-2.910	0.004	-7.920	-1.547
γ	10.816	3.644	2.970	0.003	3.674	17.958
φ	-6.623	2.259	-2.930	0.003	-11.049	-2.196
ρ	0.873	-	-	-	0.959	0.649
R^2			0.359			
Transport equipment						
α	-0.066	0.029	-2.300	0.021	-0.123	-0.010
β	-0.507	0.455	-1.120	0.265	-1.398	0.384
γ	2.887	1.372	2.100	0.035	0.198	5.576
φ	-2.257	0.970	-2.330	0.020	-4.158	-0.357
ρ	0.313	-	-	-	0.570	0.011
R^2			0.541			
Manufacturing nec						
α	-0.011	0.028	-0.390	0.696	-0.066	0.044
β	1.062	0.442	2.400	0.016	0.195	1.929
γ	-2.691	1.280	-2.100	0.035	-5.200	-0.183
φ	1.725	0.877	1.970	0.049	0.007	3.444
ρ	0.512	-	-	-	0.700	0.189
R^2			0.393			
Electricity, Gas and Water supply						
α	-0.130	0.021	-6.080	0.000	-0.172	-0.088
β	0.907	0.273	3.330	0.001	0.373	1.442
γ	-2.116	0.700	-3.020	0.002	-3.487	-0.744
φ	1.315	0.457	2.880	0.004	0.419	2.212
ρ	0.769	-	-	-	0.888	0.520
R^2			0.496			
Construction						
α	0.175	0.089	1.970	0.048	0.001	0.349
β	-0.353	1.246	-0.280	0.777	-2.794	2.089
γ	1.310	3.162	0.410	0.679	-4.887	7.507
φ	-0.915	2.047	-0.450	0.655	-4.928	3.097
ρ	0.712	-	-	-	0.852	0.481
R^2			0.267			
Wholesale and Retail Trade; Restaurants and Hotels						
α	0.037	0.037	1.010	0.315	-0.035	0.109
β	-0.538	0.339	-1.590	0.113	-1.203	0.127
γ	1.183	0.745	1.590	0.112	-0.278	2.643
φ	-0.686	0.457	-1.500	0.133	-1.581	0.210
ρ	0.915	-	-	-	0.983	0.685
R^2			0.090			
Transport and storage and Communication						
α	-0.108	0.030	-3.610	0.000	-0.167	-0.050
β	0.385	0.278	1.390	0.166	-0.160	0.930
γ	-0.857	0.623	-1.380	0.169	-2.078	0.363
φ	0.506	0.389	1.300	0.193	-0.257	1.269
ρ	0.887	-	-	-	0.970	0.643
R^2			0.323			
Finance, Insurance, Real Estate and Business Services						
α	-	-	-	-	-	-
β	-	-	-	-	-	-
γ	-	-	-	-	-	-
φ	-	-	-	-	-	-
ρ	0.956	-	-	-	1.000	0.747
R^2			-			

Table 5 – Heterogeneous non-linear time trends in industry average profit rates in Italy, 1980-2006

Estimation method: SURE on transformed data to account for first order serial correlation

	Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]	
Agriculture, Hunting, Forestry and Fishing						
α	-0.014	0.008	-1.720	0.085	-0.031	0.002
β	-0.641	0.117	-5.490	0.000	-0.870	-0.412
γ	1.338	0.328	4.070	0.000	0.694	1.981
φ	-0.792	0.224	-3.540	0.000	-1.230	-0.353
ρ	0.491	-	-	-	0.726	0.123
R^2			0.918			
Mining and Quarrying						
α	0.098	0.031	3.130	0.002	0.037	0.159
β	0.574	0.414	1.390	0.165	-0.237	1.385
γ	-0.636	1.087	-0.580	0.559	-2.767	1.495
φ	0.144	0.716	0.200	0.841	-1.259	1.547
ρ	0.652	-	-	-	0.814	0.301
R^2			0.790			
Food products, beverages and tobacco						
α	-0.035	0.008	-4.300	0.000	-0.051	-0.019
β	0.890	0.116	7.670	0.000	0.663	1.118
γ	-1.957	0.313	-6.250	0.000	-2.571	-1.344
φ	1.171	0.208	5.630	0.000	0.764	1.579
ρ	0.555	-	-	-	0.740	0.219
R^2			0.839			
Textiles, textile products, leather and footwear						
α	0.001	0.011	0.070	0.942	-0.021	0.023
β	0.041	0.148	0.280	0.782	-0.249	0.331
γ	-0.176	0.379	-0.470	0.641	-0.918	0.566
φ	0.138	0.247	0.560	0.575	-0.345	0.622
ρ	0.656	-	-	-	0.822	0.367
R^2			0.046			

	Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]	
Wood and products of wood and cork						
α	-0.033	0.006	-5.830	0.000	-0.044	-0.022
β	-0.432	0.076	-5.690	0.000	-0.580	-0.283
γ	0.970	0.231	4.190	0.000	0.517	1.424
φ	-0.586	0.167	-3.510	0.000	-0.913	-0.259
ρ	0.289	-	-	-	0.559	-0.010
R^2			0.949			
Pulp, paper, paper products, printing and publishing						
α	-0.016	0.012	-1.380	0.167	-0.039	0.007
β	0.298	0.157	1.890	0.058	-0.010	0.605
γ	-0.843	0.421	-2.000	0.045	-1.667	-0.018
φ	0.591	0.280	2.110	0.035	0.043	1.139
ρ	0.601	-	-	-	0.805	0.267
R^2			0.279			
Chemical, rubber, plastics and fuel products						
α	-0.006	0.016	-0.370	0.709	-0.037	0.025
β	-0.218	0.191	-1.140	0.252	-0.592	0.155
γ	0.155	0.455	0.340	0.734	-0.737	1.046
φ	-0.011	0.287	-0.040	0.970	-0.573	0.551
ρ	0.782	-	-	-	0.906	0.448
R^2			0.491			
Other non-metallic mineral products						
α	-0.004	0.015	-0.260	0.796	-0.033	0.026
β	0.207	0.204	1.010	0.310	-0.193	0.607
γ	-0.078	0.526	-0.150	0.882	-1.108	0.952
φ	-0.027	0.342	-0.080	0.937	-0.698	0.644
ρ	0.645	-	-	-	0.848	0.355
R^2			0.557			

continues

Table 5 – Heterogeneous non-linear time trends in industry average profit rates in Italy, 1980-2006

Estimation method: SURE on transformed data to account for first order serial correlation

continued

	Coef.	Std. Err.	z-stat	p-value	[95% Conf.	Interval]
Basic metals, metal products, machinery and equipment						
α	-0.012	0.011	-1.080	0.280	-0.034	0.010
β	-0.497	0.153	-3.250	0.001	-0.797	-0.198
γ	1.109	0.401	2.760	0.006	0.323	1.895
φ	-0.652	0.264	-2.470	0.013	-1.169	-0.135
ρ	0.606	-	-	-	0.776	0.223
R^2			0.772			
Machinery and equipment						
α	-0.014	0.011	-1.240	0.214	-0.036	0.008
β	0.180	0.135	1.330	0.184	-0.085	0.444
γ	-0.228	0.319	-0.720	0.474	-0.854	0.397
φ	0.104	0.200	0.520	0.604	-0.289	0.497
ρ	0.782	-	-	-	0.896	0.500
R^2			0.322			
Transport equipment						
α	-0.114	0.021	-5.480	0.000	-0.155	-0.073
β	0.396	0.244	1.620	0.106	-0.084	0.875
γ	-0.631	0.571	-1.110	0.269	-1.750	0.487
φ	0.288	0.357	0.810	0.420	-0.411	0.987
ρ	0.793	-	-	-	0.930	0.470
R^2			0.692			
Manufacturing nec						
α	-0.008	0.004	-2.180	0.029	-0.016	-0.001
β	-0.010	0.053	-0.190	0.848	-0.114	0.094
γ	0.448	0.171	2.630	0.009	0.114	0.782
φ	-0.373	0.126	-2.950	0.003	-0.621	-0.125
ρ	0.142	-	-	-	0.437	-0.193
R^2			0.749			
Electricity, Gas and Water supply						
α	-0.006	0.011	-0.570	0.569	-0.028	0.015
β	-0.307	0.129	-2.380	0.017	-0.560	-0.054
γ	-0.133	0.307	-0.430	0.666	-0.734	0.469
φ	0.309	0.195	1.590	0.112	-0.072	0.691
ρ	0.753	-	-	-	0.893	0.471
R^2			0.850			

	Coef.	Std. Err.	z-stat	p-value	[95% Conf.	Interval]
Construction						
α	0.138	0.027	5.100	0.000	0.085	0.191
β	0.436	0.335	1.300	0.193	-0.220	1.092
γ	-0.838	0.805	-1.040	0.298	-2.415	0.739
φ	0.477	0.509	0.940	0.348	-0.520	1.475
ρ	0.747	-	-	-	0.901	0.413
R^2			0.854			
Wholesale and Retail Trade; Restaurants and Hotels						
α	0.026	0.008	3.130	0.002	0.010	0.043
β	-0.044	0.107	-0.410	0.683	-0.252	0.165
γ	0.010	0.259	0.040	0.968	-0.497	0.518
φ	0.023	0.164	0.140	0.891	-0.300	0.345
ρ	0.748	-	-	-	0.873	0.418
R^2			0.517			
Transport and storage and Communication						
α	0.011	0.020	0.570	0.568	-0.028	0.050
β	-0.678	0.218	-3.100	0.002	-1.106	-0.250
γ	1.307	0.508	2.570	0.010	0.312	2.303
φ	-0.753	0.318	-2.370	0.018	-1.376	-0.130
ρ	0.841	-	-	-	0.927	0.546
R^2			0.522			
Finance, Insurance, Real Estate and Business Services						
α	0.023	0.012	1.940	0.052	0.000	0.047
β	-0.539	0.124	-4.350	0.000	-0.782	-0.296
γ	0.976	0.276	3.530	0.000	0.435	1.518
φ	-0.536	0.170	-3.150	0.002	-0.870	-0.202
ρ	0.839	-	-	-	0.939	0.564
R^2			0.544			

Table 6 – Heterogeneous non-linear time trends for selected industry average profit rates in the US, 1948-1997

Estimation method: SURE on transformed data to account for first order serial correlation

With inventories

	Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]			Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]	
Durable goods							**Wholesale trade**						
α	-0.040	0.011	-3.660	0.000	-0.061	-0.018	α	-0.011	0.012	-0.860	0.389	-0.034	0.013
β	0.597	0.186	3.210	0.001	0.232	0.962	β	0.299	0.160	1.870	0.061	-0.014	0.611
γ	-1.379	0.491	-2.810	0.005	-2.341	-0.416	γ	-0.943	0.374	-2.520	0.012	-1.676	-0.209
φ	0.810	0.323	2.510	0.012	0.178	1.443	φ	0.670	0.238	2.810	0.005	0.203	1.137
ρ	0.721	-	-	-	0.494	0.836	ρ	0.826	-	-	-	0.641	0.910
R^2			0.269				R^2			0.199			
Nondurable goods							**Retail trade**						
α	0.040	0.007	6.040	0.000	0.027	0.053	α	0.011	0.007	1.610	0.107	-0.002	0.024
β	-0.311	0.120	-2.580	0.010	-0.547	-0.075	β	-0.612	0.119	-5.160	0.000	-0.845	-0.379
γ	0.707	0.340	2.080	0.038	0.040	1.373	γ	1.691	0.346	4.890	0.000	1.013	2.369
φ	-0.429	0.230	-1.870	0.062	-0.880	0.022	φ	-1.101	0.240	-4.600	0.000	-1.571	-0.632
ρ	0.618	-	-	-	0.384	0.769	ρ	0.558	-	-	-	0.346	0.702
R^2			0.507				R^2			0.429			

Without inventories

	Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]			Coef.	Std. Err.	z-stat	p-value	[95% Conf. Interval]	
Durable goods							**Wholesale trade**						
α	-0.047	0.021	-2.290	0.022	-0.088	-0.007	α	-0.043	0.033	-1.310	0.190	-0.109	0.022
β	-0.359	0.324	-1.110	0.268	-0.995	0.276	β	4.351	0.472	9.210	0.000	3.425	5.277
γ	0.936	0.808	1.160	0.247	-0.648	2.520	γ	-11.003	1.137	-9.680	0.000	-13.231	-8.775
φ	-0.688	0.519	-1.330	0.185	-1.704	0.329	φ	7.146	0.733	9.750	0.000	5.710	8.582
ρ	0.806	-	-	-	0.581	0.896	ρ	0.770	-	-	-	0.567	0.881
R^2			0.493				R^2			0.749			
Nondurable goods							**Retail trade**						
α	0.052	0.011	4.820	0.000	0.031	0.072	α	0.044	0.013	3.490	0.000	0.019	0.069
β	-1.974	0.181	-10.910	0.000	-2.329	-1.620	β	-2.117	0.201	-10.520	0.000	-2.511	-1.722
γ	4.812	0.509	9.450	0.000	3.814	5.811	γ	5.511	0.593	9.290	0.000	4.348	6.674
φ	-3.060	0.348	-8.800	0.000	-3.742	-2.378	φ	-3.561	0.419	-8.500	0.000	-4.382	-2.740
ρ	0.627	-	-	-	0.390	0.776	ρ	0.565	-	-	-	0.367	0.723
R^2			0.768				R^2			0.687			

Table 7 – Econometric tests for convergence and gravitation of average profit rates

	All sectors			Manufacuring sectors only		
	χ^2	degrees of freedom	p-value	χ^2	degrees of freedom	p-value
Convergence hypothesis						
Italy	337.15	17	0.00	180.84	10	0.00
Finland	216.59	16	0.00	106.75	10	0.00
Denmark	450.89	17	0.00	69.41	10	0.00
US with inventories	111.58	4	0.00	-	-	-
US without inventories	106.91	4	0.00	-	-	-
Gravitation hypothesis						
Italy	5151.69	68	0.00	2236.66	40	0.00
Finland	989.88	64	0.00	285.67	40	0.00
Denmark	2297.08	68	0.00	443.56	40	0.00
US with inventories	168.47	16	0.00	-	-	-
US without inventories	852.40	4	0.00	-	-	-

Table 8 - Nonlinear trends in sectoral incremental rates of return on capital (IRORs) in the US, 1988-2007

	α[a]	β[a]	γ[a]	δ[a]	ρ	95% confidence interval	
Agriculture, Hunting, Forestry and Fishing	0.36	6.29	18.52	12.96	-0.61	-0.83	-0.22
	0.01	*0.00*	*0.00*	*0.00*			
Mining and Quarrying	0.36	4.49	10.81	6.76	-0.28	-0.58	0.12
	0.09	*0.13*	*0.22*	*0.27*			
Food products, beverages and tobacco	0.22	2.15	2.12	0.40	-0.04	-0.44	0.28
	0.61	*0.72*	*0.90*	*0.97*			
Textiles, textile products, leather and footwear	0.81	7.81	18.10	11.15	0.22	-0.17	0.51
	0.00	*0.01*	*0.03*	*0.06*			
Wood and products of wood and cork	0.25	3.26	11.44	8.19	0.17	-0.19	0.52
	0.45	*0.45*	*0.35*	*0.34*			
Pulp, paper, paper products, printing and publishing	-0.03	0.30	1.38	1.30	-0.12	-0.43	0.27
	0.85	*0.89*	*0.83*	*0.77*			
Chemical, rubber, plastics and fuel products	0.40	3.96	10.36	-6.17	0.11	-0.24	0.46
	0.00	*0.02*	*0.03*	*0.07*			
Other non-metallic mineral products	0.27	6.17	17.40	11.09	-0.43	-0.66	0.01
	0.34	*0.10*	*0.11*	*0.14*			
Basic metals and metal products	0.37	3.68	7.77	3.91	0.03	-0.29	0.36
	0.17	*0.32*	*0.47*	*0.60*			
Machinery and equipment	0.14	0.61	-	-	-0.01	-0.38	0.31
	0.00	*0.00*	-	-			
Transport equipment	0.01	0.06	0.73	-	-0.40	-0.67	0.01
	0.95	*0.96*	*0.53*	-			
Manufacturing nec	0.14	1.01	4.49	-3.52	-0.24	-0.53	0.14
	0.50	*0.72*	*0.57*	*0.52*			
Electricity, Gas and Water supply	0.01	0.77	2.99	2.36	-0.10	-0.47	0.24
	0.92	*0.67*	*0.58*	*0.53*			
Construction	0.01	0.80	5.17	4.10	0.28	-0.09	0.59
	0.97	*0.84*	*0.66*	*0.61*			
Wholesale and Retail Trade; Restaurants and Hotels	0.03	0.04	0.99	1.00	0.05	-0.34	0.42
	0.71	*0.97*	*0.76*	*0.66*			
Transport and storage and Communication	0.04	0.23	0.86	0.66	0.08	-0.27	0.39
	0.69	*0.85*	*0.81*	*0.79*			
Finance, Insurance, Real Estate and Business Services	-0.02	0.23	0.60	0.45	0.37	-0.05	0.66
	0.85	*0.85*	*0.87*	*0.86*			

a: coefficient in normal characters, p-value in italics.

Table 9 – Econometric tests for convergence and gravitation of incremental rates of return on capital (IRORs)

	All sectors			Manufacuring sectors only		
	χ^2	degrees of freedom	p-value	χ^2	degrees of freedom	p-value
Convergence hypothesis						
Austria	39.61	17	0.00	20.97	10	0.02
Finland	57.72	17	0.00	18.08	10	0.05
Italy	36.90	14	0.00	9.86	9	0.36
The Netherlands	445.41	17	0.00	14.63	10	0.14
Norway	45.61	17	0.00	8.29	10	0.60
US	4857.62	17	0.00	50.92	10	0.00
West Germany	18.00	16	0.32	9.64	10	0.47
Gravitation hypothesis						
Austria	98.03	61	0.00	60.64	40	0.02
Finland	174.54	64	0.00	31.94	22	0.07
Italy	415.08	58	0.00	70.87	26	0.00
The Netherlands	4547.17	68	0.00	78.53	40	0.00
Norway	61.62	41	0.02	21.46	40	0.99
US	14464.62	65	0.00	245.87	38	0.00
West Germany	1374.00	65	0.00	168.94	40	0.00