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the role of institutions**

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CROSS-COUNTRY DIFFERENCES IN SELF-EMPLOYMENT RATES: THE ROLE OF INSTITUTIONS

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Abstract

This paper examines the role of institutional variables in determining the large disparities observed in self-employment rates across OECD countries. Our findings suggest that a large public sector reduces the scope for independent work, while high levels of product market regulation are positively associated with the self-employment rate. In countries with high levels of perceived corruption, a high tax and social contribution wedge fosters self-employment, probably because independent work makes it easier to evade tax and social contribution. Cross-country, time-series data show that taxation has an opposite impact in the other countries.

The case of Italy, which stands out among developed countries for its large self-employment rate, is analysed in some detail in the concluding section, providing examples of the importance of the identified institutional variables in fostering self-employment.

Contents

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1. Introduction[1]

Self-employment shows substantial cross-country variability even when the analysis is restricted to OECD economies. Yet, self-employment is typically neglected in labour market comparisons, and characteristics of labour markets such as wage-setting rules, firing restrictions, replacement ratios, union density etc., that are usually taken into account in international comparisons, refer to employees only. However, if taxation, social insurance eligibility, incomes, working time and working conditions differ between the self-employed and employees, labour markets are likely to be affected in a substantial way by the spread of self-employment.

In some countries - Italy being an outstanding example - self-employment accounts for a substantial share of the labour force. In others, like Norway and other Nordic countries, it is almost negligible. Is there any reason for such large differences? Is it a matter of workers' "taste" or rather of options available to people when choosing a job?

In this paper we investigate these questions by studying the relation between the self-employment rate and the institutional characteristics of OECD countries. Institutions evolve quite slowly, are more likely to be country specific, and shape the structure of incentives affecting employment choices. In principle, tax levels, social security contributions, labour and business regulations, are in principle important factors in determining the opportunity cost of being self-employed, or in determining, as employers, the opportunity cost of hiring people instead of buying services from independent workers. Other variables, even if potentially important, like technological factors and industry composition, tend to converge across industrialised economies and are less likely to account for the persistent nature of observed differences in self-employment rates, and their time patterns.

In the first part of the paper, we analyze time trends of self-employment. There is weak evidence of convergence across countries, and differences in the industry composition of employment seem to play a minor role. In this section we also show the negative association between self-employment, levels of development and capital intensity.

In the second part, we move on to describe OECD countries according to five institutional variables: public sector size, tax and social contribution wedge, regulation of the product market, employment protection legislation, and an indicator that tries to grasp the level of the culture of legality in the countries we consider, namely the Corruption Perception Index. In this section we discuss their potential role as determinants of self-employment rates and we present the data we use.

The public sector is thought to shrink the scope for private economic activities and so to reduce the spread of independent work. Taxation, on the contrary, can encourage self-employment insofar it allows workers or firms to avoid tax and/or social contribution payments, which is more likely to be the case the greater the toleration of irregular activities. In those countries where rules are more likely to be enforced, high taxation could even discourage entrepreneurial activities. As to product market regulation, by affecting market allocative mechanisms it can act in both directions, either supporting or discouraging self-employment and small business. Employment protection, on the contrary, is expected unambiguously to foster self-employment in that resorting to the services of independent workers is a feasible way of bypassing employment protection legislation.

Plotting countries according to the first two principal components extracted from this set of variables, we show that countries seem to cluster in groups that differ substantially as to their self-employment rates. Greece, Turkey and Italy, with high levels of taxation and of labour and product market regulation and a high Corruption Perception Index, together with the countries with a small public sector, a low wedge and a high Corruption Perception Index (Korea, Mexico and Japan), show higher than average self-employment rates. On the contrary, north European countries (Norway, Finland and Denmark), with large public sectors, high taxation and low Corruption Indexes, on average have quite low self-employment rates.

In the third section, we try to delve into the relationship between this set of institutional variables and self-employment, performing a set of regressions on a country-sector panel. As a preliminary analysis, on the lines of the description given in the of the previous section, we show a significant association between the first two principal components extracted from the institutional variables and the self-employment rate. The association remains significant even after controlling for capital per worker, introduced into

the regression to control for technological factors, as suggested by the empirical and theoretical literature. Regressions on single institutional variables show that:

- public sector size negatively affects the self-employment rate;

- the levels of product market regulation and employment protection are positively related to self-employment rates. However, once product market regulation is introduced in the regressions, employment protection is not significant.

- with regard to taxation, we show that for those countries where the level of legality is low, the tax and social contribution wedge is positively related to the self-employment rate.

In the fourth section, as far as public sector size and taxation are concerned, we check for the robustness of the results obtained in cross-section regressions regarding their sensitivity to omitted country effects by using cross-section time-series data. The results obtained in this section are largely consistent with those obtained in the previous analysis, and show that the tax and social contribution wedge has a negative impact on self-employment in countries with a higher level of legality and a positive one in those with a lower than average level of legality, as measured by the Corruption Perception Index.

In the concluding section, after a brief summary of the main results and our interpretation, we outline with some examples how the institutional factors we have taken into consideration can, in practice, help to explain the anomalous case of Italy, which stands out among the most industrialised countries for its disproportionate self-employment rate.

2. Cross-country differences and long-run trends in self-employment rates

According to a broad definition including all workers not classified as employees, in most industrialised countries the share of self-employment accounts for at most 10 per cent of people working in the non-farm sector. But there are significant exceptions.

The aggregate we consider includes entrepreneurs (those who run a firm or are helped in their activity by one or more employees), people self-employed on their own account, and unpaid family workers. Some authors do not include the last group in their definition of self-employment because they are mostly interested in workers whose business choices are

autonomous. From our point of view, however, it is important to distinguish employees protected by employment protection rules from the rest of workers, who do not benefit from them and have a different fiscal and social contribution position.

According to this broad definition, in the three-year period 1998-2000, the average self-employment rate in the non-farm sectors ranged from 5.1 to 31.5 per cent in the OECD countries excluding transition economies, with, at one extreme some north European economies and, at the other, the Mediterranean countries and some new OECD members (Table 1). Including agriculture, the self employment rate ranged from 7.5 to 53.8 per cent.

Part of the difference could be explained by statistical discrepancies across countries. The low rate in the United States, for instance, is partly due to the exclusion of "incorporated business" from the self-employment pool. According to Mancer and Picot (1999), if this category of workers were classified self-employed, as in most other countries, the self employment rate in the US would rise from about 7 per cent to 9.6 per cent, in line with other industrialised economies.

However, considering the magnitude of the observed differences, and taking into account that Eurostat data guarantee substantial definition consistency across the EU countries, statistical discrepancies can hardly justify such a large variability.

In principle, even excluding agriculture, which traditionally has a high self-employment rate, the industry composition of employment at country level could be an important explanatory factor. The self-employment rate shows a similar pattern across countries: it is higher than average in some industries like trade, restaurants and hotels, and business services, much lower in others like manufacturing and telecommunications. Hence, economies specialised in the former should show higher self-employment rates than those specialised in the latter. In fact, differences in industry composition are not big enough to account for self-employment variability. Comparing self-employment rates at the sector level across the European economies, it is apparent that countries with high self-employment rates gave higher than average rates in almost every sector (Table 2); moreover, computing theoretical self-employment rates by assuming the same industry composition for each European country (the European average), self-employment rates do not differ substantially from those actually observed (Table 3). In Italy, regardless the already high level, the self-

employment rate would be higher still if its industry composition were the same as the European Union average.

Self-employment rates in the non-farm sectors do not show a clear convergence pattern. In the period 1970-2000 (Figure 1) there is only a weak negative relation between the increase in the self-employment rate and its level at the beginning of the period, and it is mainly due to Japan. Thus, differences among OECD countries seem to be persistent, and it is not possible to identify a common trend: during the 1970s, some economies experienced an upturn in the self-employment rate after a steady declining trend, others showed an increase only during the 1990s, and others again exhibited a constant decline or a substantial stability (Table 4).

These different patterns suggest that no common factor, like technological trends or industry composition shifts across countries, was at work. Acs, Audrecht and Evans (1994), in a panel analysis for the OECD countries, find that the self-employment rate is negatively related to GDP and positively related to the share of valued added of the service sector. According to their results, the upturn in self-employment in the 1970s in some countries and the recent increase in others are to be considered a temporary effect of structural change in the industry composition of employment that should be offset in the long run by the growth of GDP. The negative relationship between the level of development and the self-employment rate in the non-farm sector is quite evident in a cross-section analysis. The simple regression between self-employment and per capita GDP in purchasing power parity terms explains more than 60 per cent of cross-country variability, even if some countries, notably Italy, Korea and Greece, present substantially higher than expected rates. This correlation has been justified on theoretical grounds by the model developed by Lucas (1978). According to this model, as capital per worker grows the ratio between rents and wages progressively decreases, so that marginal entrepreneurs who operate small, less efficient businesses tend to become employees and the average firm size increases unless this trend is counter-balanced by technological change. In his article, Lucas provides some evidence for the US that firm size and GDP, as a proxy for capital endowment, were indeed negatively related once a trend was included in the regression (with a negative sign on the parameter estimate). Figure 3 shows the relation between the self-employment rate in the

non-farm sectors and capital per-worker as measured in the Summers Eston data set. The negative relation appears quite clear and consistent with the theoretical model.

The simple cross-country regression, however, probably does overstate the role of differences in capital per worker because of omitted variables, and cannot account for some of the differences observed, especially across countries with high levels of both per capita GDP and capital endowment. Moreover, given the persistence of self-employment differences across countries, other explanatory factors are to be found in a set of variables that show little variability over time, or at least slow convergence across different economies. Institutional characteristics seem to be natural candidates as they are relatively stable over time, and in spite of economic convergence, countries differ significantly in the way in which they regulate business and labour markets.

3. Institutions and labour choice

Institutions shape the incentive structure that a worker faces when choosing employment. We have singled out five institutional characteristics: labour market and product market regulation, taxation, size of the public sector and a measure of the general attitude to rules.

- Taxation is the institutional variable that has received most attention from economists as a potential determinant of the self-employment rate. Given that self-employees are supposed to have more opportunity to hide income from the tax authorities, these studies generally assume that the higher the tax rate on personal income, the larger is the self-employment rate. It is also possible to argue that the higher the tax and social contribution wedge on salaries, the greater is the incentive for firms to replace employees with independent contractors, possibly disguised employees, to reduce the cost of labour. This is easier in the service sector where the distinction between salaried and self-employed jobs is fairly blurred.

  A few empirical studies find some evidence in favour of this hypothesis. Blau (1987) for the US, and Schuetze (1999) for Canada and the US find a positive relation between tax rate and self-employment rate. Robson and Wren (1999) for a panel of OECD countries find a positive relation with the average tax rate but a

negative relation with the marginal one. Others researchers have challenged the positive relation between the self-employment rate and tax rates on the grounds that taxation is to be considered a constraint on entrepreneurial activities.

Davis and Henrekson (1999), for instance, claim that the smaller share of small-business and self-employment in Sweden compared with the USA can be partially explained by the higher personal income tax rate. They argue that those activities where small firms are more represented, like personal services, were implicitly penalised by the high level of taxation and by the limited possibility to use the instruments designed to reduce the tax burden on business, such as tax-deductible interest payments and other mechanisms like the accelerated depreciation of machinery, which favoured capital intensive sectors.

The evidence of the importance of taxation may be only apparently conflicting in that we should also take into account enforcement. If high tax rates are enforced by an efficient administration regardless of employment status, taxation could be neutral or even negatively related to self-employment if high tax rates discourage entrepreneurial activities[2]. On the contrary, if the capacity to enforce tax rules is weak, or substantially lower for the self-employed, self-employment will probably be encouraged by high levels of taxation and social contributions. This ambiguity can explain why there is no clear-cut evidence on the effects of taxation on the self-employment rate. In the empirical analysis we will try to overcome this difficulty by interacting our measure of the tax and social contribution wedge with a proxy for law enforcement in different countries.

- Davis and Henrekson also point out that in Sweden public sector expansion in activities like schooling and health-care has substituted public employment for private operated business. Insofar its expansion crowds out private entrepreneurial activities, public sector size is a potential explanatory variable for the self-employment rate.

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[2] In the model developed by Robson and Wren (1999), for instance, self-employment income is more strictly related to the effort provided, so that an increasing marginal tax rate has a negative impact on self-employment rate.

- Market regulation. Some studies have established a theoretical and empirical link between employment protection legislation and the self-employment rate (Grubb and Wells (1993), OECD (1999)). In economies with high levels of employment protection firms would prefer to rely on sub-contractors rather than employees so as to avoid hiring and firing restrictions. According to this point of view, the higher the employment protection guaranteed by labour market rules, the higher would be the self-employment rate.

    Less clear, apparently, is the theoretical link between the self-employment rate and product market regulation. It could be argued that a high administrative burden is detrimental to business activities and in particular to small business. On the other hand, business regulation can also be used by public authorities to protect small-sized firms from large-sized competitors and can discourage the growth of firms operating in some specific fields. In Italy, for instance, the trade sector has a disproportionately large share of family-held shops, probably because market regulation has discouraged the spread of chain store until recent reforms. Moreover, in Italy, regulation of the liberal professions does not allow advertisement or the constitution of stock companies; these restrictions can be seen as major obstacles to the development of large-sized firms and thereby as one of the reasons for the fragmentation of these activities.

In order to implement our empirical analysis we have collected data that should proxy the above institutional characteristics in 23 or 25 countries, depending on the variables at stake.

We consider industrialised countries belonging to the OECD. Given the focus on institutional characteristics, we do not take into account former Communist countries because their transition towards a market economy is not complete and their economies are still affected by recent history.

For the regulatory environment we use the indicators of labour and product market regulation produced by the OECD, as recently published by Nicoletti Scarpetta Boylaud (1999). The labour market indicators take into account regulations on regular and temporary contracts. This is based on the OECD review of national laws affecting hiring and firing; the

assessment of the OECD has been checked by member countries and incorporates their suggestions[3]. The product market indicators aim to measure public intervention on allocative mechanisms without assessing its quality; they simply try to evaluate how friendly national regulations are to market mechanisms in three areas: state control over business enterprises, barriers to entrepreneurship, barriers to international trade and investments. The basic information was provided by member countries through a questionnaire supplemented by other sources, and was aggregated in synthetic indicators by factor analysis; in our analysis we use the broadest of these, which is expected to grasp the attitude of national regulations towards market mechanisms.

To evaluate the role of taxation we use OECD data on tax and social contribution rates net of public transfers, published in The Tax\Benefit Position of Employees. Tax and contribution rates are computed for several different positions in the income scale and for different family conditions; in our analysis we take the average over the wedge for a couple with mean income and only one person employed and the average for a single person with mean income.

As a proxy for countries' attitude towards rules and their enforcement we use the Corruption Perception Index (CPI) produced by Transparency International, an international leader in anti-corruption research. This index is based on a number of different surveys measuring the perception of the degree of corruption by business people, risk analysts and the general public. Comparing this index averaged over the period 1997-99 with historical data, the ranking of countries shows a low level of variability over time; this index is also strongly correlated with the three indicators published in La Porta, Lopez de-Silanes, Shleifer, Vishny (1996) on corruption, rule of law, and efficiency of the judicial system. The correlation coefficient in our sample with the CPI is 0.92 for the first, 0.82 for the second and 0.80 for the last. This seems to testify to the robustness of the measure we used and its capacity to capture the characteristics of a country with regard to law enforcement and the general attitude towards illegal activities. In our analysis we use an average of the index for

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[3] These indicators are undoubtedly affected by measurement errors. The indicators computed for Italy, for instance, overstate the role of employment protection because of the erroneous inclusion within firing costs of a special kind of severance payment which is due to the worker irrespective of the reason for the separation, even in case of resignation or retirement.

the years 1997, 1998 and 1999, and of the historical index computed by Transparency International over the period 1988-1992 in order to capture long-lasting characteristics of the countries.

As a proxy for the size of the public sector we use the value added share of producers of government services from the OECD National Accounts. This measure is just a proxy for the relative size of the public sector; it does not include market services directly produced by the government. However, the size of the government services is likely to be correlated with the size of the public sector at large: indeed, countries with public sector, that is well-known to be large, like the Scandinavian ones, present a larger than average value for our indicator.

In Table 5 we report the self-employment rate in non-farm sectors, capital per worker in purchasing power parity terms and the institutional indicators.

As shown in Table 6, self-employment has a high degree of correlation with capital per worker, corruption index, product market regulation and, to a lesser extent, the public sector size and labour market regulation. In this univariate analysis, the tax and social contributions wedge does not appear to be related to self-employment.

These variables also show a substantial degree of multico-linearity. The CPI is correlated with capital per worker. The taxation level is related, not surprisingly, to the size of the public sector. Labour market protection is strongly correlated with product market regulation, and they are both related to the degree of corruption and to a lesser extent to capital per worker.

As a preliminary analysis, in Figure 3 we plot the first two principal components that summarize the information content of the five institutional variables we consider. The first, in the vertical axis, is strongly and positively related to labour and product market regulation, to the degree of corruption and, to a smaller extent, to the taxation level; the second one, on the horizontal axis, is positively correlated with the level of taxation and public sector size, and negatively related to the corruption index (Table 7). On the vertical axis, Greece, Turkey and Italy are opposed to Anglo-Saxon economies; the first are highly regulated and display a high level of corruption perception, the second show a low level of market regulation and a lower than average CPI. On the other axis, new OECD members, Mexico and Korea, are opposed to three Scandinavian countries (Sweden, Finland, and Denmark) which have a high

level of taxation, a larger than average public sector, and a low CPI. In the centre is a group of continental European countries.

Some relation seems to emerge between the countries' position in Figure 4 and their self-employment rate. Countries like Italy, Greece and Turkey, placed on the upper part of the vertical axis, and Mexico and Korea, on the extreme left of the horizontal one, have high self-employment rates; Scandinavian countries placed on the right of the horizontal axis have a lower than average self-employment rate.

Relying on previous considerations we could speculate that the combination of high levels of regulation, taxation and a low level of legality, as in Turkey and Greece, or a small public sector together with a high level of corruption and a low fiscal and social contribution wedge, as in Mexico, Korea and to some extent Japan, are positively related to self-employment. On the contrary, high taxation, combined with a low level of corruption and a large public sector, are detrimental to independent work. These insights, however, need to be further investigated, taking into account the role of capital intensity as suggested by univariate correlation and Lucas' theoretical analysis.

4. The role of institutional characteristics in self-employment rates: an empirical assessment using cross-country, cross-industry data

In this section we perform regressions using data on six sectors and 23 or 25 countries depending on the set of variables included in the analysis. The sectors we consider are: manufacturing; construction; trade, hotels and restaurants; transport and communication; financial and business services; other services. We exclude sectors such as "energy gas and water" and "mineral extraction" where the share of self-employment is almost nil in every country. These country-sector panel regressions allow us to control for the industry composition of economic activity in different countries, while expanding the degrees of freedom.

Given that our dependent variable ranges from zero to one, a natural specification for the functional form is the logistic function:

(1) $$y = \frac{1}{1 + e^{-x\beta - \varepsilon}},$$

where y is self-employment rate, x is a set of regressors and ε an error term. This can be made linear for OLS estimation by transforming the dependent variable in the following way:

$$(2) \qquad y^{*} = \ln\left(\frac{y}{1-y}\right) = x\beta + \varepsilon \,.$$

The choice of the logistic function is supported by the data. In fact, while the regressions we performed based on the linear model usually failed the RESET test passed by a very small margin, the logistic model always succeeded.

To better understand the structure of the data, and as a benchmark for the following analysis, we first show the results of a regression of the self-employment rate[4] on two sets of country and industry dummies. They explain together about 79.5 per cent of overall variability. Industry dummies account for 32.3 per cent of self-employment variability, while country dummies explain 46.1 per cent of it (Table 8). The relevance of our regressors can be assessed comparing their explanatory power with that of country dummies.

As a first general assessment of the role of institutional variables, we begin by regressing the self-employment rate at the sector level on industry dummies and the two principal components we plotted in Figure 4, controlling for capital per worker. This multivariate regression bears out the descriptive analysis of the previous section. Even controlling for capital per worker, the two principal components turn out to be significantly related to the self-employment rate. The first one, which is correlated with the regulation levels in both the labour and the product market, and to a lesser extent to the tax and social contribution wedge and to the corruption index, is positively related to the self-employment rate. The second one, which is positively correlated with the wedge and the public sector size and negatively with the CPI, is negatively related to the self-employment rate (Table 9, column 4). From this exercise it seems that countries with high self-employment rates on average have a combination of high levels of the tax wedge and high levels of market regulation and of the Corruption Perception Index. On the contrary those with a larger than

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[4] From now on we refer to our transformed variable as the self-employment rate.

average public sector, high taxation and social contribution wedge and low levels of corruption have a low self-employment rate.

As to the explanatory power of our set of regressors, the addition of capital intensity and institutional characteristics to industry dummies contributes for 32.3 percentage points to the R-square of the regression, which is quite high compared with the 46 per cent explained by the country dummies in the benchmark model.

To get a better understanding of the specific role of the different institutional variables, we then regress self-employment rates on the original institutional variables, considering first regulation and taxation separately, and then trying to assess their joint role.

The results for regulation are reported in Table 10. Product market regulation is positively correlated with the self-employment rate (column 1). In regression (4), where we control for capital per worker, its parameter remains significant, as when we include the public sector size within the regressors (5), whose parameter is, as expected, negative and significant. Similar results are obtained with labour market regulation, although this turns out not to be significant once we introduce product market regulation in the regression (columns 3 and 8). Taking these results at face value, it seems that public intervention in the product market, more than employment protection, can encourage the spread of self-employment. Our interpretation of this, is that in countries with pervasive market regulation, independent workers, possibly politically organised, can influence public intervention so as to mitigate competition from large business, preventing the market from reaching more efficient equilibria. Product market regulation, however, is highly co-linear with employment protection, and we cannot exclude that both product and labour market regulation play a role in affecting the self-employment rate.

Turning to taxation and public sector size, in Table 11 we report the regression of self-employment rate measured at sector level on capital per worker, public sector size and the taxation level. Public sector size, as we have already seen, negatively affects the self-employment rate (column 1). The tax wedge is not significantly related to the self-employment rate (2). However, once we interact our measure with a dummy denoting those countries with a higher than average CPI, we observe that the wedge has a negative impact on self-employment and that its effect is inverted for countries with a high level of

corruption (3). Once we control for the pubic sector size, only the positive impact of the wedge for those countries with a higher than average corruption index remains significant (6), but it is no more significant for the other countries. This could be due to the co-linearity between public sector size and tax wedge. These results seem to support the idea that a high tax and social contributions wedge can encourage the spread of independent work, insofar as self-employment allows workers to evade taxes and permits firms to evade social contributions: this is more likely to be the case in countries where illegal or irregular activities are more tolerated.

In the end, we have jointly introduced taxation, public sector size and regulation variables together in the regression (Table 12). The results of this exercise confirm the previous ones. Regulation of the product market and taxation, in countries with a higher than average Corruption Perception Index, seems to foster self-employment, whereas public sector size and capital intensity tend to reduce it.

5. An extension using cross-country, time-series data

The available information does not allow us to check the robustness of the whole set of results obtained in the previous section with regard to the presence of omitted country-specific effects. However, the availability of time series on taxation and public sector size allows us to address the problem at least for this subset of variables.

We built up a panel of country-year observations for the period 1979-2000 for the same group of countries we analysed above, and performed the regression of self-employment rate in the non-farm sectors on per capita GDP (as a proxy of capital intensity), the public sector employment rate (computed using data from the OECD Economic Outlook database), and the tax and social contribution wedge, already described in the previous section[5], interacted with the dummy denoting those countries with a larger than average CPI. The unemployment rate is included within the regressors as a control for the cyclical position of the countries.

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[5] Before 1993, the OECD collected data on a two-year basis. For the period 1979-1993, we have computed missing information by interpolating the available data.

In order to smooth short-run fluctuations, we follow Blanchard Wolfers (2000) and Bertola, Blau, and Kahn (2002) by arranging the data in three-year intervals, with the exception of the first, which is a four-year time span, and taking averages over these intervals. Consequently, we have an unbalanced panel with at most seven observations per country.

As in the previous section we use a logistic specification, even if the linear form gives substantially the same results, and we introduce country-effects and country-specific time trends within the regressors to control for fixed and time-varying country-specific unobserved factors.

Therefore our model reads:

(3) $$y_{it} = x_{it}\beta + T\gamma_i + \mu_i + \lambda_i + \varepsilon_{it}$$

where x is a matrix of covariates, T is a time trend, μ is a time-invariant, country-specific effect, λ is a time effect common across countries.

In Table 13 we present our regression results for both the levels and the first difference of the model. By differencing we get rid of time-invariant country-specific effects, while fixed effects control for the country-specific time trend. In the model in levels, both country-specific fixed effects and time trend are explicitly introduced within the regressors. In both cases we used OLS and a generalised least square estimator, correcting for heteroskedasticity and country-specific first- order autocorrelation[6]. Comparing the results obtained with the two estimators, parameter estimates for public sector size and tax wedge differ in size and show different standard errors, but they do not contradict each other.

The results of these exercises appear substantially coherent with those obtained in cross-section regressions presented in the previous section. The public sector size negatively affects the self-employment rate, and the tax and social contribution wedge affects countries with a higher than average Corruption Perception Index in a different way from those with a lower than average level of this indicator. This result seems even sharper than that obtained in cross-section regressions, given that, even controlling for the public sector size, the wedge

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[6] See Bertola Blau Kahn (2002) for an application.

seems to foster self-employment in countries where the CPI is relatively high and to hinder its spread in those where the CPI is relatively low.

These results have proved to be robust to changes in sample composition; in fact, they did not change when performing regressions by dropping one country at a time from the sample. Moreover, a dynamic specification gives substantially the same results (Table 14).

6. Conclusions

Self-employment rates differ in a substantial and persistent way across countries. We have shown that industrial composition plays a minor role in explaining such large disparities and we have argued that institutional variables, together with still strong differences in capital endowment even among OECD countries, are the most likely factors behind differences in self-employment rates. We have singled out five institutional variables: public sector size, labour and product market regulation indicators, tax and social contribution wedge and the Corruption Perception Index, the last as a proxy for the degree of legality of a country. Univariate analysis shows that the self-employment rate is correlated with the public sector size, labour and product market regulation, and the Corruption Perception Index.

The regression of the self-employment rate on capital intensity and the two principal components extracted from these variables shows that countries with tight regulation, heavy taxation and a high corruption index have higher than average self-employment rates, whereas those with large public sectors, high taxation and a low CPI show a lower incidence of self-employment.

Regressions performed using single institutional variables as regressors seem to confirm these results: larger public sectors reduce self-employment rates, whereas high levels of the tax and social contribution wedge foster its spread in countries where the corruption index is higher. As to market regulation, we find that the indicator for the product market is positively related to the self-employment rate.

Regressions performed on cross-country, time-series data, which allow us to control for country-specific effects, show that the impact of public sector size and taxation obtained

in cross-country regression does not depend on missing country effects. These results seem to confirm the difference in the impact of the tax and social contribution wedge according to the level of legality of a country, as its parameter turns out to be positive in countries with a higher than average Corruption Perception Index and negative in the others.

Our interpretation of these results is that product market regulation can be used by public authorities to protect fragmented, possibly inefficient market equilibria, and that in countries with a comparatively low levels of legality, self-employment can be fostered by the fact that it offers more chance to avoid tax and social contribution payments. On the contrary, economies with a large public sector offer less scope for entrepreneurial activities and self-employment in general. Moreover, high levels of taxation can discourage entrepreneurial activities if taxation rules are fully enforced regardless of the employment status, as is likely to be the case in countries with a lower than average CPI.

The case of Italy offers an interesting example of how these institutional characteristics can, in practice, affect the employment structure. Italy's self-employment rate stands out among the industrialised countries and is a well-known characteristic of the Italian economy (Sestito, 1989). In the last 30 years, in spite of the renewed upturn in self-employment in many industrialised countries, its ranking has remained almost unchanged, as the self-employment rate has risen slightly in Italy too since the mid 1970s.

Italy has both a high tax and social contribution wedge and a high CPI; these characteristics should induce high levels of tax evasion and according to previous analysis should foster self-employment. This is consistent with research on tax evasion in Italy (Bernardi Bernasconi (1996), Cannari, Ceriani D'Alessio (1995), Alesina Marè (1996), according to which it is not only comparatively large but also a particularly common phenomenon among independent workers and small businesses. Moreover, in recent years, special contractual arrangements, such as the so called "continuous and coordinated contractual relationships", have fostered bogus self-employment in Italy. These contracts are sometimes used to hire economically dependent workers as independent ones, so as to benefit from the reduction in social contribution payments this entails and to bypass employment protection legislation and national contract provisions (Altieri Carrieri, 2000). This kind of phenomenon is not confined to Italy, but it seems more common here than in other countries (OECD (2000), EiroObserver (2002)).

Italy also offers clear examples of how product market regulation can create favourable conditions for the spread of self-employment. The retail trade sector, which by itself accounts for a large part of the anomalous situation in Italy, is the most important example of this. Under previous regulations, municipalities and local committees, composed of the mayor, shop-keepers' representatives and other institutions, were in charge of drawing up the so-called "retail trade plans", which explicitly stated the number of shops and stores that could be established in each area. This system represented a substantial barrier to the spread of chain stores, by granting to incumbent shop-keepers' representatives the power to prevent large companies from entering local markets, and causing a fragmentation of the market structure (Pellegrini (1994), Pellegrini (1996), Autorità Garante per la Concorrenza (1993)). In turn, this seems to explain why, in spite of recent reforms, independent workers in this sector still account for about 58 per cent of total employment, as opposed to an average of 26 per cent at European level.

We believe that factors of this kind, which our analysis has shown to be significantly associated with the spread of self-employment across OECD countries, have contributed in a substantial way to determining the large self-employment rate in Italy and to supporting the well-known entrepreneurial spirit of the Italian people.

Tables and figures

Table 1

SELF-EMPLOYMENT RATES
(averages over the period 1998-2000)

Countries	Non-farm sectors	Total economy
AUS	12.7	14.8
AUT	8.9	13.7
BEL	15.6	16.9
CAN	9.9	11.2
DEU	9.9	10.9
DNK	7.7	9.4
FIN	9.9	14
FRA	9.5	12
GBR	11.6	12.2
GRC	31.5	42.8
ICE	14.9	17.9
IRL	13.9	19.6
ITA	26.4	28.4
JPN	13.5	17.3
KOR	31.2	38.3
LUX	7.7	9.5
MEX	30.8	38
NLD	10.1	11.6
NOR	5.1	7.5
NZL	17.2	20.9
PRT	19.3	27.8
SPA	18.7	21.8
SWE	9.5	11.3
TUR	27.7	53.8
USA	6.8	7.7

Sources: Eurostat and OECD.

Table 2

SELF-EMPLOYMENT RATE BY SECTOR IN 1998

Industry	EU-15	B	DNK	DEU	GRC	ESP	FRA	IRL
Agriculture (A-B)	67.7	79.1	57.6	47.9	95.9	62.7	69.9	81.5
Mining and quarrying (C)	4.2	0.0	0.0	1.6	5.6	3.5	2.1	0.0
Manufacturing (D)	8.5	6.1	4.6	5.2	29.1	12.9	5.8	7.3
Electricity, gas, water supply (E)	2.3	0.0	0.0	1.5	0.0	1.2	0.5	0.0
Construction (F)	23.8	25.6	15.6	11.9	36.5	22.5	22.2	27.0
Wholesale and retail, repairs (G)	25.5	34.9	13.9	14.5	56.1	37.7	17.8	20.4
Hotels and restaurants (H)	27.4	44.0	16.2	24.8	48.2	35.8	26.7	18.4
Transport, communication (I)	11.6	6.3	10.1	7.6	28.6	25.9	5.1	19.5
Financial intermediation (J)	7.3	12.9	1.2	10.3	5.2	6.7	4.5	5.5
Real estate, business act. (K)	22.8	28.2	16.1	22.4	55.2	24.4	12.8	22.2
Public administration (L)	0.3	0.3	0.0	0.0	0.4	0.0	0.1	0.0
Other services (M-Q)	10.1	12.4	4.0	10.1	15.5	9.8	8.0	9.9
Non-farm sectors	14.2	16.0	7.9	9.9	32.1	19.7	9.8	14.1
Total	16.7	17.4	9.7	11.0	43.4	23.1	12.5	20.2

Industry	ITA	LUX	NLD	AUT	PRT	FIN	SWE	GBR
Agriculture (A-B)	62.3	80.0	56.9	86.4	83.5	75.5	70.8	53.3
Mining and quarrying (C)	11.4	0.0	0.0	9.1	5.9	20.0	0.0	4.0
Manufacturing (D)	17.0	4.8	4.9	5.0	13.9	6.2	5.5	5.4
Electricity, gas, water supply (E)	6.2	0.0	0.0	0.0	9.4	0.0	0.0	3.9
Construction (F)	39.2	0.0	15.5	7.1	26.7	26.5	23.0	35.1
Wholesale and retail, repairs (G)	57.4	13.6	13.2	12.1	41.8	16.4	20.4	12.5
Hotels and restaurants (H)	45.2	25.0	16.3	24.2	35.7	11.7	18.1	13.0
Transport, communication (I)	18.0	8.3	5.2	5.6	14.6	12.2	10.0	11.9
Financial intermediation (J)	13.9	0.0	3.8	3.5	6.9	4.2	2.3	4.1
Real estate, business act. (K)	47.8	16.7	14.7	18.4	26.9	16.8	17.3	20.0
Public administration (L)	0.6	0.0	0.6	0.0	0.7	0.0	0.0	0.6
Other services (M-Q)	16.1	7.7	8.6	8.5	10.6	5.9	4.4	10.2
Non-farm sectors	26.6	7.8	10.1	8.8	20.1	9.9	9.6	12.0
Total	28.7	9.9	11.7	13.8	28.8	14.6	11.4	12.7

Source: Eurostat.

Table 3

**ACTUAL AND THEORETICAL SELF-EMPLOYMENT RATES
IN NON-FARM SECTORS**

	Self-employment rate 1998	Theoretical self-employment rate[1]	Difference
EU-15	14.2	14.2	0.0
EUR-11	14.5	14.7	-0.1
AUT	8.8	8.5	0.3
BEL	16.0	16.7	-0.7
DEU	9.9	10.4	-0.5
DNK	7.9	8.0	-0.1
ESP	19.7	18.1	1.7
FIN	9.9	10.2	-0.3
FRA	9.8	10.3	-0.5
GBR	12.0	11.7	0.3
GRC	32.1	30.1	2.0
IRL	14.1	13.2	0.9
ITA	26.6	27.1	-0.4
LUX	7.8	7.8	0.0
NLD	10.1	8.8	1.3
PRT	20.1	19.1	1.0
SWE	9.6	10.1	-0.5

Sources: Eurostat, own calculations.

[1] Theoretical values are computed assuming the European average employment sector composition according to the following:

$$SS_{.j} = \sum_i \frac{S_{ij}}{E_{ij}} \frac{E_{ie}}{E_{.e}}$$

where i, is the sector, j the country, e is the European average, S is the number of self-employed, E is total employment, SS is the self-employment rate.

Table 4

SELF-EMPLOYMENT RATE IN THE NON-FARM SECTORS

Country	1970	1978	1990	1998	2000
AUS	9.6	12.3	13.0	12.4	12.3
AUT	12.7	9.4	7.9	8.7	8.7
BEL	15.2	14.3	16.4	16.9	16.9
CAN	7	7.2	7.4	10.2	9.5
DEU	10.3	8.3	8.5	9.9	9.6
DNK	13.4	11.4	8.6	7.7	7.2
FIN	6.7	6.9	9.5	10.2	10.0
FRA	12.5	10.7	9.3	8.2	7.9
GBR	6.7	6.8	14.2	12.5	11.7
GRC	-	31.9	32.4	32.1	30.4
ICE	10.3	8.5	11.3	14.9	15.0
IRL	10.8	11.0	13.8	14.2	13.7
ITA	24.5	22.7	25.8	27	26.7
JPN	22.6	21.4	17.3	13.7	13.2
KOR	-	34.5	27.9	31.3	31
LUX	12.3	9.8	7.1	5.7	5.6
MEX	-	-	33.1	31.5	30.3
NLD	-	8.7	9.1	10.4	9.9
NOR	8.6	8.0	7.0	5.6	5.1
NZL	-	9.4	15.5	17	17.4
PRT	13.1	15.5	18.2	20.1	18.7
SPA	21.2	19.8	21	20	17.8
SWE	6.2	4.5	7.8	9.1	9.0
USA	7.6	7.4	7.7	7.1	6.6

Source: OECD.

Table 5

SELF-EMPLOYMENT RATE, PER CAPITA GDP, CAPITAL PER WORKER AND INSTITUTIONAL CHARACTERISTICS

Country	S- e. rate 1998-2000 non-farm sectors	Per capita GDP 1997	Capital per worker	PSS 1993	CPI Corruption Perception Index	Wedge 1997	Product market regulation	Employmen t protection
AUS	12.7	21949	38729	3.8	1.3	19.7	0.9	1.1
AUT	8.9	23077	36641	13.6	2.4	38.9	1.4	2.4
BEL	15.6	23242	39416	12.4	4.7	48.7	1.9	2.1
CAN	9.9	23761	44970	10.4	0.8	27.9	1.5	0.6
DEU	9.9	22049	41115	11.6	2.0	44.0	1.4	2.8
DNK	7.7	25514	33814	19.7	0.0	38.2	1.4	1.5
FIN	9.9	20488	47498	17.9	0.4	44.9	1.7	2.1
FRA	9.5	21293	37460	17.1	3.4	44.1	2.1	3.1
GBR	11.6	20483	22509	11.6	1.5	28.4	0.5	0.5
GRC	31.5	13912	23738	9.4	5.0	36.0	2.2	3.5
IRL	13.9	20634	22171	14.5	1.9	28.9	0.8	1.0
ICE	14.9	24836	26488	13.6	0.6	10.8	-	-
ITA	26.4	21265	33775	12.8	5.2	47.4	2.3	3.3
JPN	13.5	24574	41286	7.7	3.9	18.2	1.5	2.6
KOR	31.2	14477	17995	8.0	5.9	12.0	2.4	2.3
LUX	7.7	33119	55377	10.7	1.3	24.1	-	-
MEX	30.8	7697	13697	5.5	6.9	25.3	1.9	2.0
NLD	10.1	22142	34084	10.2	1.0	38.3	1.3	2.4
NOR	5.1	26771	47118	16.2	1.1	31.2	2.2	2.9
NZL	17.2	17846	35359	10.8	0.7	18.9	1.3	1.0
PRT	19.3	14562	13493	15.4	3.3	30.4	1.7	3.7
SPA	18.7	15990	30888	13.4	3.8	36.4	1.6	3.2
SWE	9.5	20439	41017	20.6	0.6	48.0	1.4	3.2
TUR	27.7	6463	7626	10.3	6.6	42.0	2.9	3.6
USA	6.8	29326	35993	11.9	2.5	27.6	1.0	0.2

Table 6

CORRELATION COEFFICIENTS

	Self-employment rate in non-farm sectors	Capital per worker	PSS	Wedge	Product Market Regulation	Employment Protection Legislation	CPI
Self-employment rate	1						
Capital per worker	-0.72 (0.00)	1					
PSS	-0.46 (0.02)	0.23 (0.27)	1				
Wedge	-0.13 (0.54)	0.16 (0.43)	0.53 (0.01)	1			
PMR	0.58 (0.00)	-0.26 (0.24)	-0.00 (0.98)	0.25 (0.26)	1		
EPL.	0.38 (0.08)	-0.19 (0.38)	0.21 (0.33)	0.46 (0.03)	0.70 (0.00)	1	
CPI	0.82 (0.00)	-0.60 (0.00)	-0.44 (0.03)	0.07 (0.74)	0.66 (0.00)	0.44 (0.03)	1

Table 7

PRINCIPAL COMPONENT LOADING FACTORS

Variable	First principal component C1	Second principal component C2
Wedge	0.34	0.53
PSS	0.09	0.68
Product market regulation	0.59	-0.15
Employment protection	0.58	0.09
CPI	0.44	-0.48

Table 8

R-SQUARES OF THE REGRESSION ON INDUSTRY AND COUNTRY DUMMIES

Dependent variable: $y^* = \ln(y/(1-y))$, where y is the self-employment rate	Industry dummies	Country dummies	Industry and country dummies
R2	0.323	0.461	0.795

Table 9

REGRESSIONS ON PRINCIPAL COMPONENTS EXTRACTED FROM INSTITUTIONAL VARIABLES

Dependent variable: $y^* = \ln(y/(1-y))$, where y is the self-employment rate	1	2	3	4
Capital per worker	-	-0.035 (0.000)	-0.030 (0.000)	-0.024 (0.000)
1st principal component	0.169 (0.000)	0.107 (0.003)	-	0.126 (0.000)
2nd principal component	-0.26 (0.000)	-	-0.147 (0.001)	-0.169 (0.000)
R2	0.581	0.593	0.600	0.646
RESET test (P-value)	0.868	0.956	0.996	0.844
Number of observations	136	136	136	136

P-values in brackets (robust standard errors).
Sector dummies included within the regressors.

Table 10

REGRESSIONS ON REGULATION VARIABLES

Dependent variable: $y^* = \ln(y/(1-y))$, where y is the self-employment rate	1	2	3	4	5	6	7	8
Capital per worker	-	-	-	-0.035 (0.000)	-0.030 (0.000)	-0.037 (0.000)	-0.030 (0.000)	-0.029 (0.000)
PSS	-	-	-	-	-0.044 (0.000)	-	-0.052 (0.000)	-0.047 (0.000)
Product market regulation	0.502 (0.000)	-	0.523 (0.000)	0.349 (0.000)	0.375 (0.000)	-	-	0.310 (0.011)
Employment protection	-	0.176 (0.002)	-0.015 (0.826)	-	-	0.109 (0.003)	0.166 (0.001)	0.050 (0.446)
R2	0.430	0.375	0.430	0.606	0.646	0.576	0.630	0.648
RESET test (P-value)	0.443	0.568	0.456	0.999	0.992	0.974	0.979	0.997
Number of observations	136	136	136	136	136	136	136	136

P-values in brackets (robust standard errors).
Sector dummies included within the regressors.

Table 11

REGRESSIONS ON PUBLIC SECTOR SIZE AND TAX AND SOCIAL CONTRIBUTION WEDGE

Dependent variable: $y^* = \ln(y/(1-y))$, where y is the self-employment rate	1	2	3	4	5
Capital per worker	-0.037	-0.039	-0.029	-0.037	-0.029
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PSS	-0.037	-		-0.052	-0.035
	(0.000)			(0.001)	(0.053)
Wedge	-	0.001	-0.010	0.011	-0.002
		(0.839)	(0.006)	(0.042)	(0.618)
CPI*Wedge[1]	-	-	0.015		0.012
			(0.000)		(0.000)
R2	0.611	0.584	0.645	0.623	0.661
RESET Test P-value	0.988	0.964	0.800	0.804	0.793
Number of observations	148	148	148	148	148

[1] CPI is a dummy denoting countries with a higher than average CPI.
P-values in brackets (robust standard errors).
Sector dummies included within the regressors.

Table 12

REGRESSIONS ON REGULATORY VARIABLES, PUBLIC SECTOR SIZE AND TAX AND SOCIAL CONTRIBUTION WEDGE

Dependent variable: $y^* = \ln(y/(1-y))$, where y is the self-employment rate	1	2	3
Capital per worker	-0.030	-0.027	-0.027
	(0.000)	(0.000)	(0.000)
PSS	-0.056	-0.045	-0.045
	(0.000)	(0.000)	(0.000)
Wedge	0.007	0.001	0.001
	(0.281)	(0.833)	(0.825)
CPI*Wedge [1]	-	0.008	0.008
		(0.036)	(0.033)
Product market regulation	0.301	0.203	0.204
	(0.011)	(0.124)	(0.073)
Employment protection	0.023	0.001	
	(0.738)	(0.986)	
R2	0.652	0.663	0.663
RESET test P-value	0.992	0.876	0.875
Number of observations	136	136	136

[1] CPI is a dummy denoting those country with a CPI index higher than the average.
P-values in parenthesis (Robust standard errors).
Sector dummies included within the regressors.

Table 13

CROSS-COUNTRY TIME-SERIES REGRESSIONS ON PUBLIC SECTOR SIZE AND TAX AND SOCIAL CONTRIBUTION WEDGE
(levels and first differences model)

Dependent variable: $y^* = \ln(y/(1-y))$, where y is the self-employment rate in the non-farm sectors	(1) OLS Levels	(2) GLS[2] levels	(3) OLS first differences	(4) GLS first differences
Per capita GDP	0.002 (0.880)	-0.005 (0.342)	0.002 (0.895)	-0.04 (0.554)
PSS	-0.030 (0.060)	-0.019 (0.000)	-0.018 (0.163)	-0.013 (0.007)
Wedge	-0.014 (0.003)	-0.10 (0.000)	-0.011 (0.020)	-0.007 (0.009)
CPI*Wedge [1]	0.020 (0.000)	0.017 (0.000)	0.018 (0.002)	0.013 (0.000)
Unemployment rate	0.026 (0.001)	0.019 (0.000)	0.020 (0.003)	0.016 (0.000)
Country dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Country specific time trend	Yes	Yes	No	No
Number of observations	160	160	134	134

CPI is a dummy denoting countries with a higher than average CPI.
Generalised least square, allowing heteroskedasticity across panels and autocorrelation within panels.
P-values in brackets.

Table 14

CROSS-COUNTRY, TIME-SERIES REGRESSIONS ON PUBLIC SECTOR SIZE AND TAX AND SOCIAL CONTRIBUTION WEDGE
(dynamic model)

Dependent variable: $y^* = \ln(y/(1-y))$, where y is the self-employment rate in the non-farm sectors	(1) OLS	(2) GLS[2]
Lagged dependent variable	0.339	0.406
	(0.003)	(0.000)
Per capita GDP	-0.012	-0.026
	(0.367)	(0.000)
PSS	-0.002	-0.013
	(0.829)	(0.011)
Wedge	-0.015	-0.012
	(0.010)	(0.011)
CPI*Wedge [1]	0.018	0.019
	(0.013)	(0.000)
Unemployment rate	0.009	0.007
	(0.200)	(0.025)
Country dummies	Yes	Yes
Time dummies	Yes	Yes
Country-specific time trend	Yes	Yes
Number of observations	134	133

CPI is a dummy denoting those countries with a higher than average CPI.
Generalised least square, allowing heteroskedasticity across panels and autocorrelation within panels.
P-values in brackets.

Figure 1

**SELF-EMPLOYMENT RATE INCREASE OVER THE PERIOD 1970-2000 ON
SELF-EMPLOYMENT RATE IN 1970**

coef = -.34, se = .18, t = -1.87
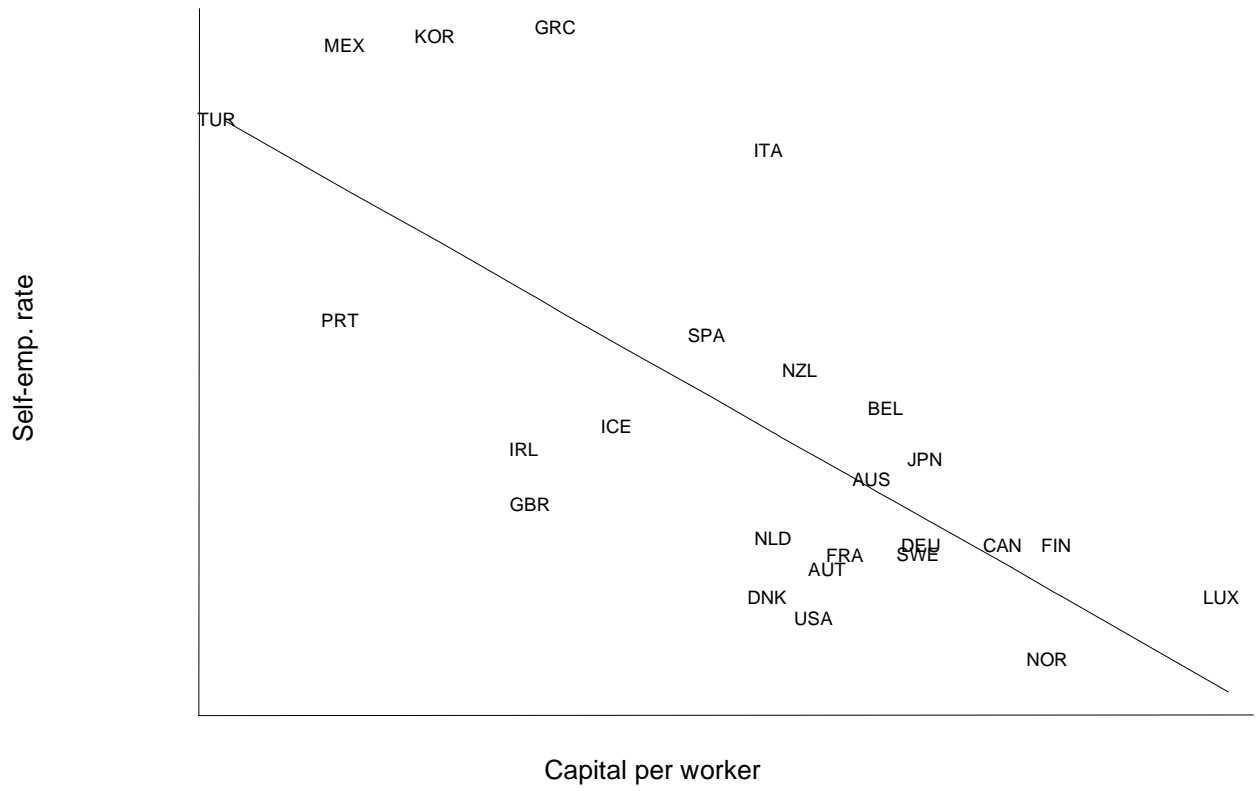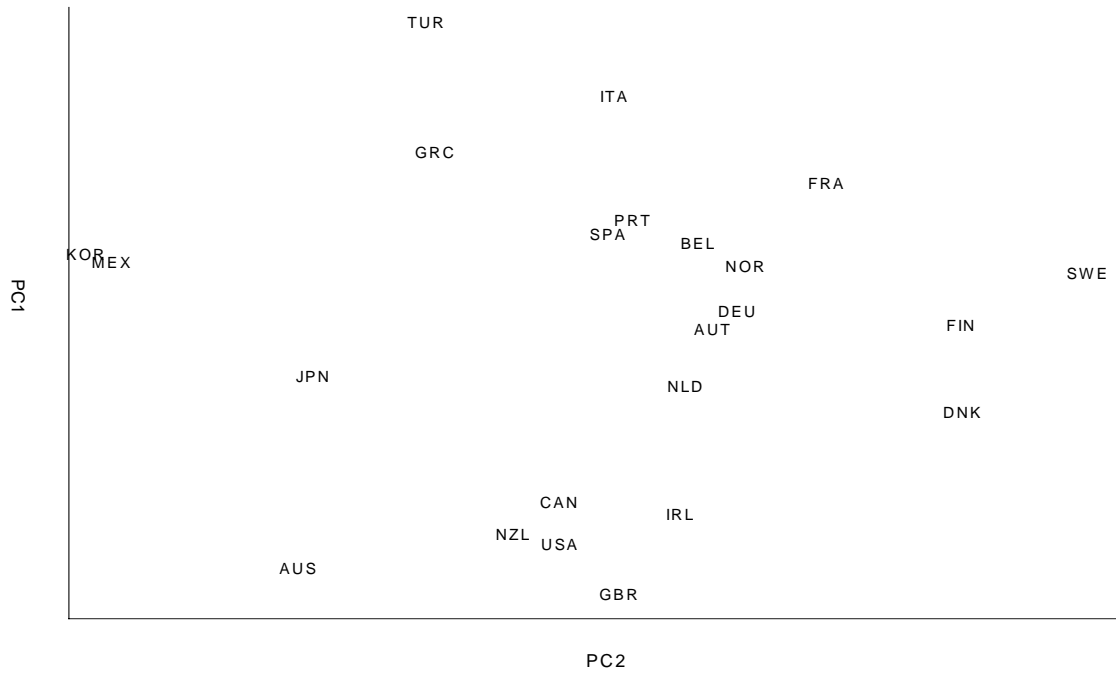

Delta 1970-200

1970
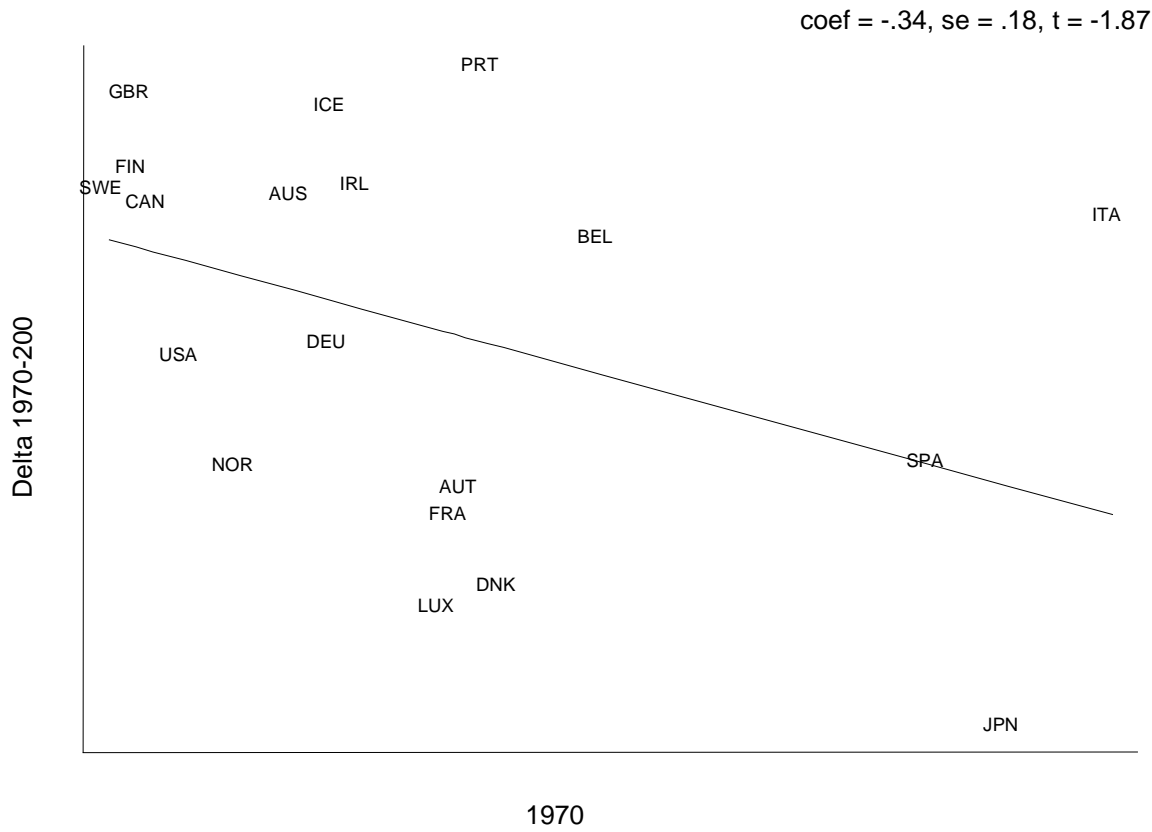
Figure 2

SELF-EMPLOYMENT RATE ON CAPITAL PER WORKER

Figure 3

FIRST PRINCIPAL COMPONENT OF INSTITUTIONAL CHARACTERISTICS ON THE SECOND ONE

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