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## Article

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## Variations of Self-Employed in Eurozone Countries: The Role of Corruption and Wage Rate Growth

By Gregory T. Papanikos<sup>\*</sup>

*This study emphasizes two variables as significant determinants of the number of individuals who choose self-employment. First, it is assumed that the opportunity cost of self-employment has a negative effect. This cost is measured as the income that would be earned in wage employment. Second, self-employment provides more opportunities for tax evasion and tax avoidance. The higher the corruption rate, the higher the self-employment rate. These two variables—wages and corruption scores—are used as potential determinants of the ratio of self-employed persons to the total labor force. Data from the twenty Eurozone countries are employed to test these hypotheses. Both hypotheses cannot be rejected based on the empirical evidence.*

**Keywords:** Eurozone countries, wage growth, self-employment corruption, labor force, unemployment

### Introduction

Self-employment is promoted in many countries as a policy tool to decrease unemployment (OECD, 2022). The choice of self-employment is an individual decision. However, like many other economic decisions, the option of self-employment is subject to constraints determined by aggregate economic and non-economic conditions. These conditions are country-specific. For example, variations in wage growth and differences in the prevalence of corruption between countries may explain the fluctuations in self-employment ratios.

As a control to test other country-specific effects, this study uses a homogeneous group of countries with a common currency and well-integrated markets. The twenty Eurozone countries share a common currency, constituting an ideal sample to test the roles of corruption and wages. In addition, the Eurozone employs fiscal and monetary policies, along with various other policy instruments such as subsidies, to promote the development of entrepreneurship and the creation of small businesses.

This paper investigates these two basic determinants of self-employed persons and tests their statistical significance using data from the twenty Eurozone countries. The opportunity cost of self-employment is defined as the foregone income of a job that pays a wage. The higher this wage rate, the greater the cost, and therefore, the lower the number of people who opt for self-employment.

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On the other hand, self-employed individuals may exploit a country's administrative tax mechanisms to pay fewer taxes, either through tax avoidance or tax evasion. A more corrupt country may grant more concessions to self-employed groups by enacting laws that promote tax avoidance. Additionally, a more corrupt country reduces the risk of identifying and punishing those who systematically evade taxes. Therefore, corruption increases rates of self-employment.

These two variables—the wage rate and the level of a country's corruption—are used to explain variations in the number of self-employed persons in the twenty Eurozone countries. To overcome cyclical effects and account for long-run trends, average values from the 2010s are used.

This paper is structured as follows: the next section examines a simple model of self-employment determination, leading to an empirical equation. The following two sections discuss the descriptive evidence of the three variables of interest and report the regression results of the estimates of the parameters of the empirical equation model. The last section concludes.

## A Theoretical Framework

The labor market has been extensively analyzed in economics, encompassing various aspects of the self-employment issue. However, this section does not review this literature.<sup>1</sup> Instead, it provides a simple theoretical framework based on the perceived employment alternatives for an individual.

Individuals who decide to work have two choices. First, they can participate in the labor market, where their labor services are demanded by others, such as private (profit and nonprofit) firms and public organizations.<sup>2</sup> The supply of their labor time in this market depends on a real net-wage rate, defined as gross wages minus taxes on wages. Second, individuals may choose to work independently as self-employed. In this case, their labor supply services depend on expected income minus taxes.<sup>3</sup> Taxes on wages and taxes on income from self-employment do not coincide, primarily due to tax avoidance and, most importantly, tax evasion. The

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<sup>1</sup>There are numerous categories of self-employed individuals, including solo entrepreneurs and small business enterprises. Typically, these businesses employ family members and a limited number of hired workers who receive wages. Even within these distinctions, various sub-categories may exist. Van Stell & de Vries (2015) extensively reviewed the literature on different forms of solo employment.

<sup>2</sup>In many instances, individuals working for public organizations, such as public schools, may engage in non-reported self-employment, not accounted for in the official data used in this study.

<sup>3</sup>The impact of taxes on self-employed individuals has been the subject of examination in numerous studies. For a recent study with an accompanying literature review, please refer to Arulampalam & Papini (2023). However, it's important to note that their study is confined to Norway, and the authors themselves acknowledge that their dataset does not allow for the analysis of tax avoidance and tax evasion—factors contributing to a positive correlation between self-employment and tax increases. The body of literature concerning tax evasion and tax avoidance is extensive; for instance, you can consult studies by Slemrod (2007) and Sugata et al. (2017).

extent of tax avoidance and tax evasion depends on the level of corruption in a country. The higher the corruption, the greater the level of tax avoidance and tax evasion.<sup>4</sup>

Let  $E$  be the total number of persons employed, with  $E_w$  representing those in wage-employment and  $E_{se}$  in self-employment occupations. Total employment is then calculated as:

$$E = E_w + E_{se}$$

Dividing it by the total labor force ( $L$ ), the self-employed labor force ratio is calculated as

$$E_{se}/L = E/L - E_w/L$$

It is assumed that over a ten-year period, the unemployment rate ( $UR$ ) is constant and defined as follows:

$$UR = U/L = (L-E)/L = 1 - E/L$$

Here,  $U$  represents the total number of unemployed persons. If  $UR$  is constant in the long run, the employment rate ( $E/L$ ) is also constant. Thus, in the long run, the self-employed employment ratio depends on the number of wage-earners to total employment. Wage-earners' employment is positively influenced by net wages, defined as the total wage rate ( $w$ ) minus the tax rate ( $t$ ). Therefore, the self-employment rate is a function of both the total wage rate and the tax rate on wage income:

$$E_{se}/L = E/L - E_w/L (w-t)$$

or

$$E_{se}/L = \text{constant} - E_w/L (w-t)$$

An increase in the wage rate decreases the ratio of self-employed individuals. Conversely, an increase in the wage tax rate raises the ratio of self-employment to the total labor force.

It is assumed that tax enforcement differs between wage employment and self-employment. Wage earners pay taxes when they receive their wages, unless it is an illegal employment situation. These taxes cannot be evaded or avoided.

On the other hand, taxes paid by self-employed individuals depend on voluntary compliance by taxpayers who report their true income from all sources. Income from self-employment can be underreported because there is a nonzero probability that tax authorities may not be able to determine the true income. As demonstrated in Papanikos (2015) for the case of Greece, this greatly depends on the effectiveness, efficiency, and, most importantly, the willingness of tax authorities.

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<sup>4</sup>I do not delve into the theoretical counterarguments that render this hypothesis indeterminate. For a comprehensive discussion, please refer to Schuetze and Bruce (2004).

Here, it is assumed that self-employed persons pay fewer taxes than wage earners for the same income because the former conceal their total income. This opportunity to hide income from self-employment depends on several factors, with the most crucial one being the level of corruption. This is country-specific. The higher the corruption in a given country, the greater the likelihood of tax evasion and tax avoidance. In such countries, it is expected that, *ceteris paribus*, the percentage of self-employed persons will be higher. The simple model to be estimated is as follows:

$$E_{sc}/L = b_0 + b_1 * \text{Corruption} - b_2 * \text{Wage} + \mathbf{b} * \mathbf{Z}$$

where  $\mathbf{Z}$  is a column vector of dummy variables, including the year of entry into the Eurozone, Mediterranean country status, etc., and  $\mathbf{b}$  is a row vector of the corresponding coefficients.

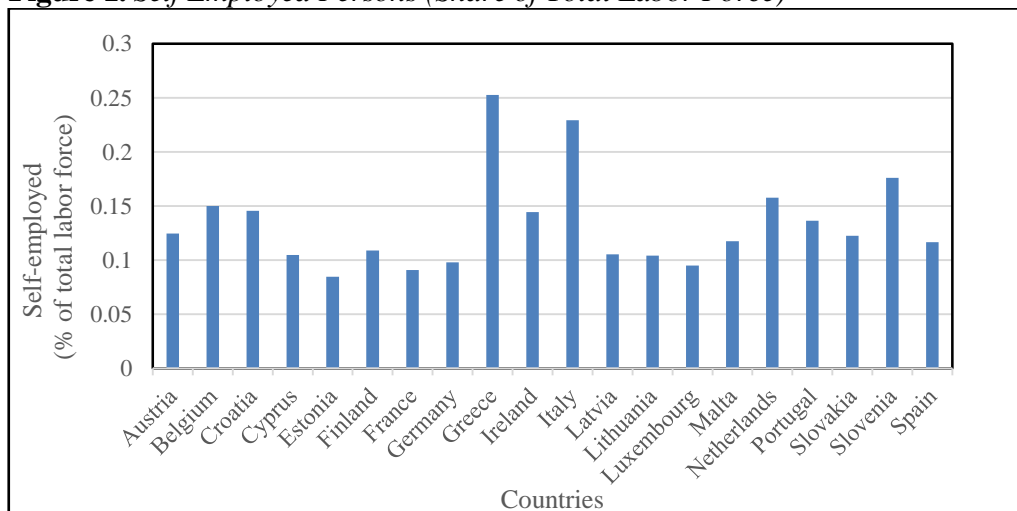
The aforementioned simple specification was estimated using data averaged over a ten-year period (2010-2019) from Eurozone countries to account for long-term trends. Another possible estimation approach could have been panel data, but many regressors are time-invariant (e.g., Eurozone year, density, area).

The next section presents the descriptive statistics of the model variables, and the following sections report the results of two simple specifications.

## Descriptive Statistics

This study concentrates on three key variables: self-employed individuals, the level of corruption, and the real wage rate. Figure 1 illustrates the proportion of self-employed persons in relation to the total labor force, averaged over a ten-year period (2010-2019).

**Figure 1.** Self Employed Persons (Share of Total Labor Force)



Source: Eurostat (AMECO)

The first obvious observation is the substantial variation in self-employment among the 20 Eurozone countries. Greece and Italy notably stand out with 25.29% and 22.94%, respectively. As indicated in Table 1, in four Eurozone countries, the percentage of self-employed persons was less than 10 percent (Estonia, France, Germany, and Luxembourg). More than half of the Eurozone countries had self-employment ratios between 10 and 15 percent. It is evident that 75 percent of the countries (15 countries) had a ratio less than 15 percent.

**Table 1.** *Distribution of Self-employed Shares in the Eurozone Countries*

Self-Employment Shares	Count	Percent	Cumulative Count	Cumulative Percent
[0.05, 0.1)	4	20	4	20
[0.1, 0.15)	11	55	15	75
[0.15, 0.2)	3	15	18	90
[0.2, 0.25)	1	5	19	95
[0.25, 0.3)	1	5	20	100
Total	20	100	20	100

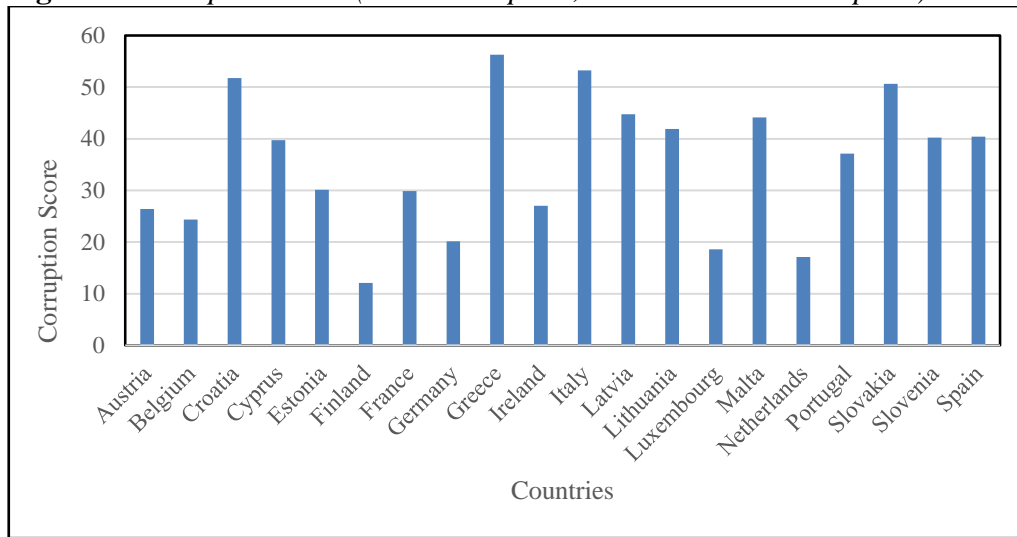
One conclusion that arises from the above descriptive evidence is the significant variation among the twenty Eurozone countries. As illustrated in Table 3 below, the average share of self-employment in the twenty Eurozone countries is 13.33%, with a maximum of 25.28% (in Greece) and a minimum share of 8.48% (in Estonia).

In this paper, these variations are explained by two variables: the level of corruption over a nearly ten-year period (2012-2019) and the opportunity cost of self-employment, measured as the average rate of growth of the real wage rate over the 2010-2019 period.

Figure 2 shows variations in corruption among the twenty Eurozone countries. The two countries with the highest corruption in the Eurozone were Greece (56.25/100) and Italy (53.25/100). As discussed above, these are also the countries with the highest self-employment ratios. However, two more countries exceeded the 50% mark of corruption (see Table 2): Croatia (51.75) and Slovakia (50.63). Three countries had a corruption score of less than 20 percent: Finland, Luxembourg, and the Netherlands. It is shown that 80 percent of the Eurozone countries had a corruption score less than 50.

The last variable of interest in this study is the wage rate. Figure 3 shows the variations in the average growth of the real wage rate over a period of nearly ten years (2010-2019). Greece experienced the most dramatic decrease in its wage rate, with an average fall of 2.66%. Lithuania, with 3.47%, had the highest increase, followed by Latvia (3.13%), Slovakia (2.93%), and Estonia (2.26%). Apart from Greece, nine other countries experienced negative or very low wage rate changes.

**Figure 2.** Corruption Index (0=no corruption; 100=maximum corruption)

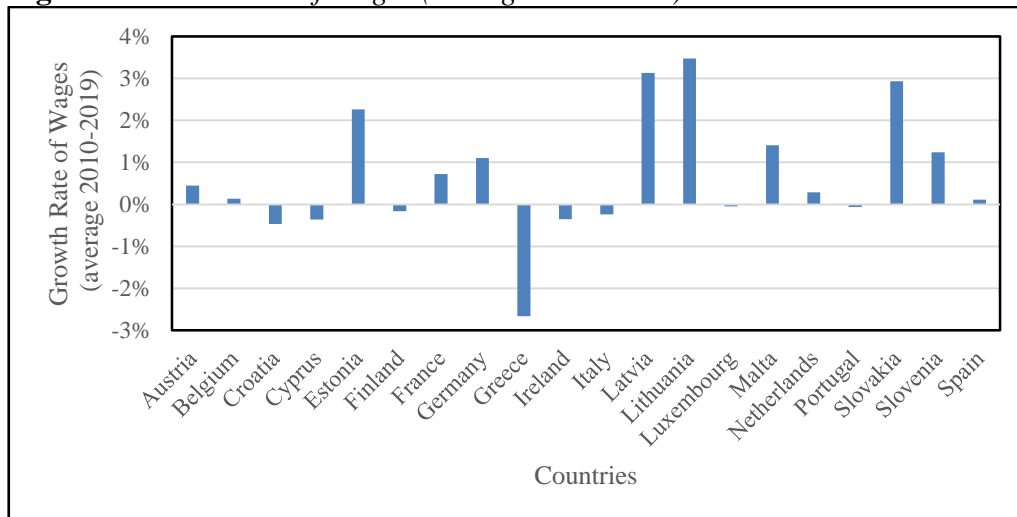


Source: Transparency International (<https://www.transparency.org/>)

**Table 2.** Corruption in the Eurozone Countries

Value	Count	Percent	Cumulative Count	Cumulative Percent
[10, 20)	3	15	3	15
[20, 30)	5	25	8	40
[30, 40)	3	15	11	55
[40, 50)	5	25	16	80
[50, 60)	4	20	20	100
Total	20	100	20	100

**Figure 3.** Growth Rate of Wages (average 2010-2019)



Source: Eurostat (AMECO)

In conclusion of the above discussion, the descriptive evidence reveals significant variations in the three variables under study. Table 3 presents summary statistics for these variables.

Greece provides an intriguing case study for the hypotheses of this research. In the 2010s, Greece had the highest self-employed ratio at 25.28%, the highest corruption score of 56, and the lowest growth in the wage rate at -2.66%.

Conversely, Estonia had the lowest share of self-employed persons, Finland boasted the lowest corruption score of 12, and Lithuania recorded the highest wage rate growth at 3.47%.

**Table 3.** *Descriptive Statistics*

	Self-employed (Share of Labor Force)	Corruption Scores (0-100)	Wage Rate Growth
Mean	0.1333	35	0.0064
Median	0.12	38	0.0021
Maximum	0.2528	56	0.0347
Minimum	0.0848	12	-0.0266
Std. Dev.	0.0442	13	0.0146
Skewness	1.44	-0.10	0.23
Kurtosis	4.47	1.89	3.19
Observations	20	20	20

Notes: The data on self-employed and wage rate growth are averages of 2010-2019; the corruption is averaged over a period of 2012-2019.

The next section tests these two hypotheses using the data presented earlier.

### Regression Results

The simple regression equation was estimated and is considered heteroscedastic. Table 4 reports the empirical results of two simple models. The estimators are heteroskedasticity- and autocorrelation-consistent (HAC) estimators of the variance-covariance matrix. However, the results did not differ significantly when using either the OLS estimators or White's heteroscedasticity-corrected standard errors.

Several other variables were tested, but they were not statistically significant, including economic variables such as the unemployment rate, the rate of growth of (per capita) output, and the inflation rate. These variables are correlated with wage rate growth. Higher real wage rate growth may result from higher economic growth and a lower unemployment rate. In such cases, the economy may experience inflationary pressures.

On the other hand, additional variables were used to account for specific country characteristics, such as whether the country belongs to the group of Mediterranean countries, population densities, area, number of airports, number of inhabited islands, etc. None of these variables were statistically significant (the results are not reported in the table). The only additional variable that demonstrated statistical significance was the year the country entered the Eurozone.

The two variables explained 52% of the variations in the share of self-employed persons in the total labor force. When the year of Eurozone entry is



included as an explanatory variable, the adjusted coefficient of determination increases to 56%.

**Table 4. Regression Results**

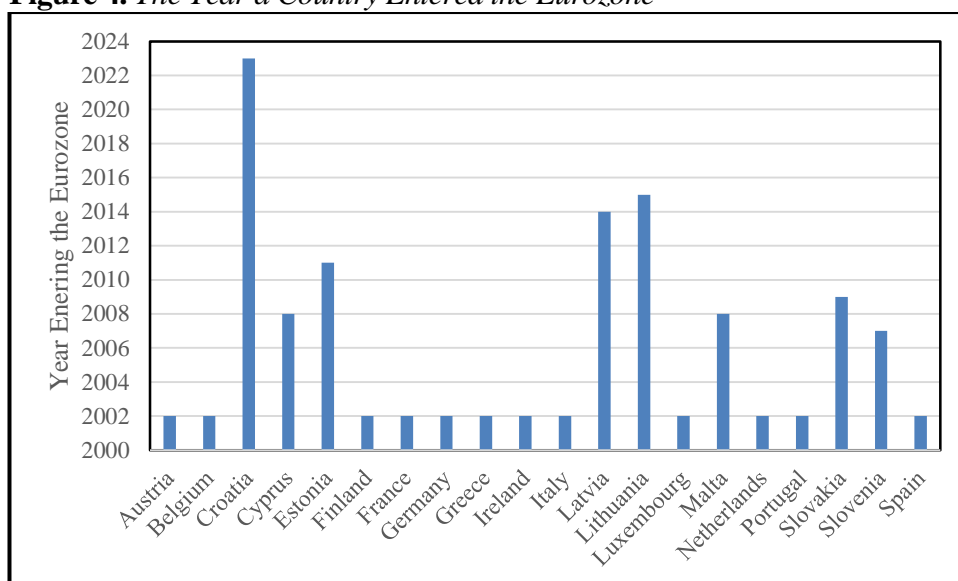
Variable	Model I	Model II
Constant	0.085*** (4.71)	4.63** (2.30)
Corruption	0.002*** (2.75)	0.002*** (3.43)
Wage Growth Rate	-1.78*** (-4.45)	-1.37*** (-4.12)
Year entering the Eurozone	----	-0.002** (-2.25)
R-squared	0.573112	0.626492
Adjusted R-squared	0.522889	0.556459
F-statistic	11.41152	8.945688
Prob(F-statistic)	0.000721	0.001033

\*\* Prob. < 0.05; \*\*\* Prob. < 0.01; t-statistics in parentheses.

All three variables exhibit the expected outcomes. The hypothesis that an increase in corruption raises the share of self-employed persons cannot be rejected. Evaluating the average value of corruption, a 10% increase in the corruption score (from 35 to 38.5) will raise the self-employment ratio by 0.007 ( $0.002 \times 3.5$ ). Assessing this increase at the average value of the ratio of self-employed persons (13.33%), the ratio will rise to 14.03%, representing a 5% increase.

Consistent with the theoretical arguments presented in section two of the paper, the wage rate has a negative effect on the ratio of self-employed persons. Higher wage rate growth increases the opportunity cost of choosing self-employment, leading fewer individuals to opt for self-employment and instead prefer wage employment.

Finally, this paper utilizes the twenty countries of the Eurozone to test the two hypotheses regarding corruption and wages because they constitute a cohesive group of countries with common characteristics. Figure 4 displays the year in which each of the twenty countries entered the Eurozone. Twelve countries were part of the original Eurozone members, commencing the common currency in 2002. Eight additional countries joined later, with Croatia being the most recent addition in 2023.

**Figure 4.** *The Year a Country Entered the Eurozone*

According to the empirical evidence reported in Table 4, the year a country joined the Eurozone has a statistically significant effect on the ratio of self-employed persons. The effect is negative, implying that the later a country joins the Eurozone, the lower its self-employment ratio. One possible explanation might be that being a member of the Eurozone and utilizing a common currency creates a more favorable economic and business environment for individuals to start their own small businesses.

## Conclusions

Self-employment is an integral component of labor markets in both developed and less developed countries. The economic macro environment within each country influences the decision to become self-employed or remain a wage-earner. This environmental factor varies across countries, accounting for significant disparities in the proportion of self-employed persons as a share of the total labor force.

The objective of this paper was to examine the impact of only two variables as determinants of the self-employment ratio at the country level, while abstracting from other micro or macro effects. The twenty Eurozone countries constitute an ideal sample of otherwise homogeneous nations. These countries share a common currency and numerous policies that promote self-employment and entrepreneurship.

Nevertheless, substantial variations exist in their self-employment rates. Data from the 2010s reveal that the self-employment ratio ranged from a minimum of 8.48% (Estonia) to a maximum of 25.28% (Greece), with an average of 13.33% among the Eurozone countries.

These variations can be attributed to differences in corruption and wage growth during the 2010s. Regression results indicate that corruption had a positive effect on the proportion of self-employed persons, while wage growth had a

negative impact. These findings align with the theoretical predictions developed in this paper.

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