**SECTORAL AND TECHNOLOGICAL ANALYSIS INTO THE ORIGINS AND DETERMINANTS OF THE EUROZONE’S ECONOMIC INEQUALITY[[1]](#footnote-1)**

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**Key words:** *Economic inequality, Unequal labour exchange, Structural composition analysis*

**JEL codes:** *B51, D63, F02*

**ABSTRACT**

The purpose of this study is to furnish empirical content upon the premise that the Eurozone’s cross-country inequalities arise from country-specific structures. Drawing on the concept of unequal exchange, inspired by Prebisch-Singer, Lewis, and Emmanuel, the authors investigate whether the national sectoral and technological compositions, through international trade, distort the equivalence between the national product received and inputs used. The quantitative analysis for the period between 2003-2016 demonstrated that the geographical distribution of the economic output is disproportionate to the labour consumed in its production. Hence, the Eurozone’s inequality remained rooted in the market disequilibria, distinct capital intensities, and distinct economic efficiencies. This research disclosed that the sectoral and technological compositions are crucial components of inequality determinants, manifesting through the divergence in profit and wage rates, social recognition of the labour consumed, and exploitation rates. Accordingly, the Eurozone’s structure intrinsically contradicts the aims of an effective single market. Given the lack of adequate corrective institutes, to prevent disintegrating tendencies, this investigation must be used as the platform for re-questioning the Eurozone’s neoliberal policy discourse. A detrimental narrative centred around the price stability ahead of full employment which favours the interest of capital over labour and affluent countries over destitute ones.

1. **INTRODUCTION**

The admirable achievement of European peace, built upon equality, cohesion, and solidarity amongst countries, faces its biggest challenge thus far. The influx of works on inequality, trending in public debates and academic writings, is a straightforward confirmation that the current state of affairs is drifting apart from the desired one. This contradicts the formal alliance of the European countries in pursuit of their ideals and threatens the very existence of their undertaking. It is apparent that the outlined goals of sustainable development, price stability, competitive markets, and full employment are unlikely to be carried out within the cross-country institutional setting. The authors link such an outcome to the excessive cross-country inequalities being the structural component and the antithesis to the economic integration, whose eradication is the imperative towards achieving long-term prosperity.

The inquiry into the European inequalities departs from the notion that they are exacerbated in two ways. Firstly, the increasing within-country inequality (Piketty, 2014; Milanović, 2016; World Inequality Lab, 2017) divides the rich citizens from the poor ones. Secondly, the growing cross-country inequality, accountable for the majority of the overall inequality (Anand and Segal, 2015), divides the countries between the affluent and the destitute. It bears mentioning that the cross-country inequality dominance is explained by Milanović’s citizenship premium (2016), determining up to two-thirds of the individual lifetime income, and Galbraith’s (2016) assertion that nationality equates to economic destiny. The first inequality type acknowledges that the marginalist theory, prescribing the inequality of rewards as proportional to the contributions, is inadequate in capturing the shortcomings of the unobstructed competitive model (Galbraith, 2000). Whereas the second type confirms that the mainstream approach to international trade, as a positive-sum game (e.g. Heckscher, 1919; Ohlin, 1993; Barro, 1997), lacks empirical evidence and overlooks the matter in its entirety. Thus, the claim that the free trade does not make all parties equally competitive (Shaikh, 2007) is evident in the present-day divergence across European countries (e.g. Hein and Truger, 2005; Dullien and Frische, 2009; Lapavitsas et al, 2012; Storm and Naastepad, 2016) and with the fact that they failed to uniformly share economic cycles (Rubinić and Tajnikar, 2019b).

Thus, it remains a puzzle why scholars are persisting in the usage of neoliberal narrative in explaining the inequalities which are vastly legitimized within their framework. In order to remedy such inconsistency, this study offers an alternative insight into the European inequality by utilizing the classical/Marxian theory established on the inequality and class antagonism.

For this purpose, the authors investigate the societal inequalities legitimized through the institution of private property and laws (Rousseau, 1984; Marx, 1992). Accordingly, the within-country inequality is captured with the fundamental theorem of exploitation (Bose, 1980), enabling the capitalists to appropriate a part of the value produced by the workers. Whereas, the cross-country inequality is studied through the use of the Unequal Exchange Theory derived from employing the exploitation dynamics on the supranational level (Yoshihara and Veneziani, 2018). The unequal exchange is seen as the secondary phenomena emerging from the underdevelopment (Shaikh, 1980) and driven by the countries’ distinct starting points (Kaldor, 1970) dating back to primitive accumulation (Harvey, 2005). Thus, the unequal exchange as a value transferring mechanism, via international trade, enables the capitalists of the affluent countries to exploit their workers and extends this exercise of power over all countries of lesser development (Bauer, 2000), even when the latter countries gain through the exchange (Marx, 1971).

It is apparent that this dynamic collides with the defined guidelines, thus proving that the concealed forces of the unequal exchange are at the root cause of the turmoil disintegrating the European countries. On these grounds, by limiting the research on the Eurozone countries, the principal focus of this study is to determine to what extent the distinct sectoral composition and technological development of national economies are influencing the international value transfers. In this regard, the Eurozone’s cross-country inequality is linked to three determinants: price effects, efficiency effects, and capital intensity effects. They, in effect, ate affecting the countries’ wage rates, profit rates, and national incomes. The significance of these interrelated effects is further considered from two aspects. The first measures the influence through the degree of the country’s recognition of the consumed labour within the equilibrium national income. The second questions whether these are altering the proportion of the consumed labour constituting non-profit (labour) incomes.

The general arguments being advanced in this study are: (1) that the trade between the Eurozone countries with distinct endowments results in unequal value transfers; (2) that the main drivers of such a state are disequilibrium prices, distinct efficiency levels, and unequal organic composition of capital across Eurozone’s countries; and (3) that these determinants are anchored to the sectoral structure and unequal development of technology across the Eurozone countries. This research seeks to advance the literature through the theoretical and empirical confirmation of the hypothesized arguments. It aims to prove that without the essential reforms, the European concept “*united in diversity*” will remain a formal postulate behind the oppression of the weak that justifies the unity based on the immense diversity in cross-country economic wellbeing.

The remainder of the research is organized as follows. Section two provides the literature overview. Section three displays the model’s theoretical understructure. Section four deals with methodological issues and data sources. The fifth section introduces the empirical model. The sixth section presents the results and arising discussion. Section seven concludes.

1. **LITERATURE OVERVIEW**

Determined by the nature of capital, the unequal development as a hallmark of the European integration project is the inevitable consequence of free trade rooted in the sphere of production and inherent to capitalism (Smith, 2008). The capitalist development is *“asymmetrical in terms of construct and inequitable in terms of outcome”* (Nayyar, 2007, p. 80). Its expansion *“locks countries into further relations of unequal exchange”* (Bieler and Morton, 2014, p. 41), where the cross-country unequal exchange *“arises when spatial production of value is disjointed from its geographical distribution”* (Ricci, 2018, p. 1).

In academic literature, there exists a broad consensus that the Eurozone countries are integrated into relations of unequal exchange (Boundi Chraki, 2018; Ricci, 2018; Tsaliki, Paraskevopoulou, and Tsoulfidis, 2017; Seretis and Tsaliki, 2016; Baiman, 2014; *inter alia*). Under the general umbrella of unequal exchange, amongst the several coexisting schools, this study builds upon two paramount intellectual currents. The first one is linked to the classical development theory constituting the structuralist unequal exchange theories founded on the work of Prebisch (1950), Singer (1950), and Lewis (1954), while the second current commences with Emmanuel (1972, 1975), who reintroduced and popularized the topic.

The pillar of the dependency theory, the Prebisch-Singer Thesis states that there exists a long-run trend in deteriorating terms of trade between the centre and the periphery. This worsening rests upon the international specialization in commodities production, where the periphery produces primary goods while the centre is orientated toward the production of the manufacturing commodities. Consequently, the asymmetrical distribution of the international trade gains arises due to the wage and profit differentials (Floto, 1989). They are founded on the trade between the raw, low-priced peripheral products and the high-priced core’s industrial goods. Accordingly, the unequal exchange occurs due to the peripheral low incomes and price elasticity of demand for their commodities, and the core’s monopolistic prices combined with the high wage rigidity (Toye and Toye, 2003; Love, 1980). Moreover, the confirmation that the cross-country unequal exchange is established on the distinct sectoral composition is argued by Lewis, who differentiates between the periphery with traditional, and the core with modern sectors (Fields, 2004). In his analytical model, the periphery, with traditional sector and abundant labour supply, maintains the low wages in contrast to the core with the modern sector and high wages. Accordingly, the unequal exchange surfaces as a result of the wage differentials, where the peripheral low-priced commodities are being exchanged for the core’s high-priced industrial goods. Inasmuch, such a value transfer favouring the core is further enhanced with the capitalist expansion and the peripheral labour productivity growth, which further deteriorates the terms of trade by lowering the peripheral export prices.

The second school of economic thought heavily influencing this research starts from the work of aforementioned authors (Bacha, 1978), and evolves around Emmanuel (1972), who coined the term Unequal Exchange[[2]](#footnote-2). Departing from the assumptions of perfect capital mobility, relative immobility of labour, and competitive markets, Emmanuel argued that international trade is the mechanism that transfers the values from underdeveloped to developed countries. He builds the Unequal Exchange theory departing from the notions of tendential international equalization of the profit rates and arising formation of the international prices of production combined with the wage differentials across the countries participating in trade. Emmanuel recognizes two types of non-equivalence. The unequal exchange in the strict sense is derived from the cross-country differences in the monetary wages initiating the transfer of values from the poor to rich economies. In this scenario, the unequal exchange is facilitated through the significantly lower peripheral real labour costs which, via the international market prices, effectively underestimate the actual amount of labour inputs embodied with the peripheral commodities (Kollmeyer, 2009). The opposite is the case with the core countries. The unequal exchange in the broad sense arises from cross-country distinct organic compositions of capital and transfers the values toward the affluent countries with high capital-intensive industries.

Although Emmanuel does a great job explaining the cross-country exploitative relations, he falls short by hypothesizing the unrealistic, uniform technology across countries (Tsaliki, Paraskevopoulou, and Tsoulfidis, 2017). It must be mentioned that Emmanuel only indirectly, and definitely insufficiently, captures the technical composition through the organic composition of capital. The uniform technology stance is refuted by, amongst others, Elmslie and Milberg (1992), and must be accounted for since the technological development reduces the production cost (Callinicos, 2010) to below the cross-country average.

On these grounds, by acknowledging and extending upon the aforementioned contributions, the authors develop a novel extension of the unequal exchange model, allowing them to quantify and investigate the importance of both the sectoral and the technological compositions within the framework of international trade, with perfect factor mobility.

1. **MEASURING THE EUROZONE’S CROSS-COUNTRY INEQUALITY**

The measurement of the Eurozone’s inequality departs from the model of Rubinić and Tajnikar (forthcoming, 2019a), conceptually founded on the classical/Marxian tradition. The cornerstone of this research is a closed-economy model used to investigate the country’s relative position within the cluster, regarding the unequal exchange. The attractive feature of the such a presumption is that it allows for the implementation of the Marxian cross-sectoral model on the cross-country dynamics. Effectively, this implies that the domestic and the international markets are ruled by the same laws (Marx, 1992b; Schumacher, 2012), and is justified by the unique monetary system, single currency, and single market. Furthermore, the authors assumed that within the Eurozone’s economy, production factors are homogenous, competitive, and mobile[[3]](#footnote-3).

If these assumptions are accepted, the Eurozone’s cross-country inequalities can be linked to three determinants: distinct utilization of market disequilibria, distinct capital-labour ratios, and distinct economic efficiencies. The effects of these determinants are measured through the cross-country deviations between profit and labour incomes, differences in output per employee, and variation in labour force exploitation.

**The influence of the market disequilibria** – the Single European Act (European Commission, 2012) integrated the Eurozone countries via single market guaranteeing the free movement of goods, capital, services, and labour. Such strategy seeks to create territory free from regulatory obstacles which would enhance factor allocation and increase efficiency. The Act’s implementation brings about the creation of the free market for each of the “four freedoms” and results in two expected tendencies. The first one equalizes the factor prices via the creation of cross-country uniform profit and wage rates, while the second one establishes the long-run equilibrium (production) price[[4]](#footnote-4). This entails the cross-country factor rewards equivalence and the elimination of the economic incentive for the factor re-allocation. Within the equilibrium, the Eurozone’s would be distributed according to the equilibrium (production) prices of the commodities and services sold within the individual countries. However, due to the (among others) monopolies[[5]](#footnote-5), imperfect competition, commodity differentiation[[6]](#footnote-6), and non-price competition, economic reality deviates from the long-run equilibrium. Accordingly, certain members fail to obtain equilibrium prices, while more successful ones, receive above-equilibrium prices for the commodities and services sold. Thus, the latter countries obtain above-average profit and/or wage rates, while the former ones obtain below-average profit and/or wage rates.

In this sense, the unequal exchange as the market disequilibria outcome (Ricci, 2018) leads to divergence and becomes the first source of the Eurozone’s cross-country inequality. The influence of disequilibrium prices on the economic performance is quantitatively investigated through the variation between countries’ actual and equilibrium . The intuition behind choosing this ratio is straightforward given that the actual consists of (probably) disequilibrium prices while the equilibrium consists of equilibrium (production) prices computed by distributing the Eurozone’s aggregate among countries according to the equilibrium profit and wage rates.

**The influence of capital-labour ratios** – the Eurozone’s is the outcome of the labour consumed for the production of commodities and services. Given that the actual prices are disproportionate to the consumed labour, the individual country does not appropriate its in accordance with the labour consumption, i.e. market forces alter the magnitude in which consumed labour is reflected within the . With this in mind, the “so-called” new value created is received by distributing the aggregate Eurozone’s according to the labour consumed within an individual country. With the onset of capitalism the distribution of among countries, apart from consumed labour, must reflect returns on capital without which production cannot be realized. Thus, the countries’ appropriation of the aggregate , in addition to consumed labour, must account for employed capital. Even if the market prices are aligned with long-run equilibrium, guaranteeing equal gross wage and profit rates in all countries, the individual countries’ would not be proportionate to the consumed labour. Consequently, countries that, per unit of labour, have less capital than the Eurozone’s average, have the higher than the equilibrium , and vice versa. This is what Emmanuel (1972) defines as the unequal exchange in a broad sense arising from different capital intensities and transferring the values toward the countries with high capital-intensive industries. This process is recognized by Fine and Saad-Filho (2010, p. 11): *“outputs do not exchange at their values but at prices of production. These prices of production differ from values, as the composition of capital is greater or less than the average for the economy as a whole”*. Influenced by the unequal value composition of capital, the latter happens even when rates of trading countries’ surplus values are equivalent to their average world counterparts (Tsaliki, Paraskevopoulu, and Tsoulfidis, 2017)*.* Therefore, the countries with average capital-labour ratios, yield an equilibrium equivalent to the consumed labour relative to the Eurozone’s total consumed labour.

**The influence of economic efficiency** - previous categories are based on actual levels of the employed production factors even though the cross-country labour productivity and capital efficiency may vary. In order to capture the distinct efficiencies influence, measured as the cumulative influence of labour productivity and capital efficiency, the authors employ the category of the efficient equilibrium . For the calculation of the efficient equilibrium , the authors use average consumption of labour per unit of and average consumption of capital per unit of for the entire Eurozone. Employment of average values allows for the computation of the country’s efficient equilibrium received by considering actual wage and profit rates and average consumption of labour and capital per unit of . It must be noted that the computation omitted the market price differences occurring between countries. Additionally, through the acknowledgment of the efficiency influence, the authors eliminated the influence of capital-labour ratios. Finally, the difference between the equilibrium and the efficient equilibrium identifies countries’ positions regarding efficiency levels.

**The formation of the wage and profit rates** – the equilibrium prices are calculated by using equilibrium wage and profit rates. A country experiences above equilibrium wage rates if their commodities and services reach prices exceeding the equilibrium. For such a country, the actual must surpass the equilibrium since this positive difference is a source for financing the above equilibrium wage rates. The same motion holds for above equilibrium profit rates. Conversely, if the country’s difference is negative, because of below equilibrium prices, the country cannot obtain the equilibrium rates. Accordingly, this difference externalizes through lower wage rates, lower profit rates, or in the worst case, both.

**The labour force exploitation** – if the aggregate Eurozone’s is distributed in accordance with the used labour, the individual countries’ equates to the labour consumed within the production. The latter represents the price expression of the consumed labour that yields the monetary expression of the new value created (Marx, 1992a). On this basis, the new value created can be compared with the total labour income (wages and public sector). The labour income share of the new value created is a source of two indicators. First, it points out how much of the countries’ consumed labour is being used for the production of labour incomes. Second, it is an indicator of how much of the countries’ used labour is appropriated by the capital, in the form of profit. According to Morishima (1973: 51), the ratio between the labour time used for the production of the profits and the labour time used for the production of labour incomes is the exploitation rate (). Formally,

(1)

The higher this ratio is, the more time workers spend producing profit appropriated on the basis of the capital ownership.

1. **Methodological Considerations and Data Issues**

In a quantitative analysis, the authors measure variation in sectoral and technological compositions of national economies in an attempt to demonstrate that they are at the root cause of international value transfers, and extending upon this point, are the determinants of the cross-country economic inequality. The impact of the sectoral and technological structure on the cross-country economic inequality is empirically analysed based on the data of the Eurozone countries, apart from Luxembourg (excluded due to the data insufficiency), for the 2003-2016 period.

The developed model employs the two-factor approach investigating the economic activity through the antagonistic relations between labour and capital. The data on labour is retrieved from Eurostat (2019a) in terms of the number of employed aged 20 to 64. The capital factor is estimated through the perpetual-inventory method endorsed by Berlemann and Wesselhöft (2014), where the capital in period , , is the weighted sum of the history of investments:

(2)

The initial capital stock at the beginning of the investment series () is calculated by following Hardberger’s (1978) approach applied through Stata’s “stockcapit” command (Armadou, 2011). This method requires data on , expressed in 2011 PPP $ and annual data on investment (Gross Fixed Capital Formation), denoted as . Both aforementioned sources are retrieved from the World Development Indicators Database published by the World Bank (2019). Here, it must be stated that the data on investment are converted to 2011 PPP $ through the usage of official conversion factors and adjusted by the price index ratio of the investment goods to and included into University of Groingen’s (2019) Penn World Tables Database (PWT 9.0). Given that this data set reports values for the period between 1950-2014, the information on the two succeeding years was estimated as the average value of the five preceding observations. Finally, the capital stock is computed through assuming the constant geometric depreciation rate ( of 5% based on Bosworth and Collins (2003).

The income shares of labour and capital are then calculated based on the United Nations National Accounts Statistics Database (UN-NAS, 2019) by disaggregating the national income as:

(3)

where, the value added or the gross domestic product () is the sum of four components: compensation of employees () comprising of gross (pre-tax) wages, gross operating surplus () indicating gross profits of corporate and government-owned enterprises, gross mixed income () or gross value added by the private unincorporated enterprises, and the indirect taxes corrected for subsidies ().

In accordance with Guerriero (2012) and Bernanke and Gürkaynak (2001), the specific factor shares are calculated by assuming the equivalence between value added and . The following step is to categorize the individual components by their income sources. While there is no question regarding the placement of the and , when it comes to incomes of unincorporated enterprises, they cannot be associated to a single source and must be dealt with separately. This is the case since the , as the income of the self-employed, includes both profit and labour incomes of unincorporated enterprises. Within the relevant literature, various methods were used to overcome this issue. While Kravis (1959) attributed the entire to the labour income, Johnson (1954), Guscina (2006), and Jayadev (2007), imputed two-thirds of to labour and one-third to profit income. Given that these methods either underestimated or overestimated the factor shares, the authors decided to break down the by using Gollin’s (2002) second adjustment. The benefit of the method used produced a twofold effect. Besides differentiating and accounting for the self-employed income, it created country-specific anchors, crucial for the cross-country analysis. Therefore, the is treated as being comprised of the equivalent labour/capital mix as the rest of the economy. On these grounds, the total profit income share () is calculated as:

(4)

Contrarily, the labour share is taken as the residual. Thus, the authors assumed that the total labour share includes gross wages, a part of the unincorporated income, and the entire public sector (). Finally, the information on the countries’ total profit and labour incomes are received by multiplying the World Bank’s (2019) 2011 PPP $ with the respective factor share.

1. **THE SPECIFICATION OF THE EMPIRICAL MODEL OF EUROZONE’S UNEQUAL EXCHANGE**

The cross-country analysis necessitates a high level of abstraction and omits numerous relevant factors. Due to this, the authors departure from the premise by Robinson (1962, p. 33) stating that *“a model which took account of all the variegation of reality would be of no more use than a map at the scale of one to one”*. Thus, the aim of this study is to disclose the crucial elements constituting the country’s advantages, enabling them to benefit from the international value transfers. It bears mentioning that the enrichment of affluent countries, by the virtue of the same token, is the function of the impoverishment of the majority of other countries.

On these grounds, this study investigates the Eurozone’s cross-country inequality determinants and their manifestations, accounting for the differences in sectoral and technological compositions across member states. The model is divided into two general forms, where suffix “a” represents the sectoral and suffix “b” the technological composition of a given country. The following equations, where denotes country and denotes year, lay out the particularities of these hypothesized effects:

**Model 1a** Price effect = f(logGDPit, logGDPp/cit, logK/Lit, Agricultureit, (5)

Manufacturingit, Constructionit , Servicesit,

Publicit, )

**Model 1b** Price effect = f(logGDPit, logGDPp/cit, logK/Lit, High-techit, (6)

Medium-techit, Low-techit, )

**Model 2a** Efficiency effect = f(logGDPit, logGDPp/cit, logK/Lit, Agricultureit, (7)

Manufacturingit, Constructionit , Servicesit,

Publicit, )

**Model 2b** Efficiency effect = f(logGDPit, logGDPp/cit, logK/Lit, High-techit, (8)

Medium-techit, Low-techit, )

**Model 3a** Labour recognition = f(logGDPit, logGDPp/cit, logK/Lit, Agricultureit, (9)

Manufacturingit, Constructionit , Servicesit,

Publicit, )

**Model 3b** Labour recognition = f(logGDPit, logGDPp/cit, logK/Lit, High-techit, (10)

Medium-techit, Low-techit, )

**Model 4a** Profit rate = f(logGDPit, logGDPp/cit, Unemploymentit, (11)

logK/Lit, Agricultureit, Manufacturingit,

Constructionit , Servicesit, Publicit, )

**Model 4b** Profit rate = f(logGDPit, logGDPp/cit, Unemploymentit, logK/Lit, (12)

High-techit, Medium-techit, Low-techit, )

**Model 5a** Wage rate = f(logGDPit, logGDPp/cit, Unemploymentit, (13)

logK/Lit, Agricultureit, Manufacturingit,

Constructionit , Servicesit, Publicit,)

**Model 5b** Wage rate = f(logGDPit, logGDPp/cit, Unemploymentit, logK/Lit, (14)

High-techit, Medium-techit, Low-techit, )

**Model 6a** Exploitation = f(logGDPit, logGDPp/cit, Unemploymentit, (15)

logK/Lit, Agricultureit, Manufacturingit,

Constructionit , Servicesit, Publicit,)

**Model 6b** Exploitation = f(logGDPit, logGDPp/cit, Unemploymentit, (16)

logK/Lit, High-techit, Medium-techit,

Low-techit, )

The aforementioned equations are executed on a strongly balanced panel data set (, ), containing a maximum of 252 (sectoral) or 238 (technological) separate observations.

The model proposed has six endogenous/dependent variables labelled either as the determinants of the Eurozone’s cross-country inequality or as their consequences, and is thoroughly explained within the previous section.

Additionally, the model has two sets of explanatory variables used to capture the unequal exchange arising from international trade. The first set contains control variables, where the authors used the following variables: logarithm of the World Bank’s (2019) economic output (log) used to capture the country’s economic size, logarithm of the World Bank’s (2019) economic output per capita (log) used to account for country’s development level, logarithm of the capital-labour ratio (log) used to address the issue of capital/labour intensity, and the Eurostat’s (2019a) unemployment rate (), used to investigate the impact of the relations on the labour markets. The second set of explanatory variables is used to investigate the specific influence of the economy’s structure on the Eurozone’s cross-country inequality. They are presented in the following table:

*Table 1. The sectoral/technological composition of the analysis*

|  |  |
| --- | --- |
| Variable | Description |
| *Sectoral Structure of Economy* | |
| Agriculture | Agriculture, forestry and fishing activities % of GVA (NACE section A). |
| Manufacturing | Manufacturing activities % of GVA (NACE section C). |
| Construction | Construction activities % of GVA (NACE section F). |
| Services | Professional, scientific and technical activities, administrative and support service activities, financial and insurance activities, real estate activities, and wholesale and retail trade, transport, accommodation and food service activities % of GVA (NACE sections: G, H, I, K, L, M, N). |
| Public sector | Public administration, defense, education, human. health and social work activities % of GVA (NACE sections O, P, Q). |
| *Technological Structure of Economy* | |
| High-tech | % of high technology in GVA (NACE 2-digit level: 21, 26). |
| Medium-tech | % of medium technology in GVA (NACE 2-digit level: 19, 20, 22-25, 27-30, 33). |
| Low-tech | % of low technology in GVA (NACE 2-digit level: 10-17, 18, 31, 32). |

Source: Eurostat (2019b).

Lastly, to control for the time specific effects, the authors include the year dummy variables.

1. **THE RESULTS**

The aforementioned model was tested through the usage of various statistical approaches: the pooled model, the fixed-effects model (with/without lags), the random-effects model (with/without lags), and the dynamic panel model. Amongst the used models, the fixed-effect (without lags) proved to be best suited for the present study. Accordingly, the analysis has led to findings that are presented in the following two tables and subsequently elaborated within the six mutually connected and exhaustive points.

*Table 2. The influence of the sectorial composition on the Eurozone's cross-country inequality (2003-2016)*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Dependent variable | **Model 1a** Price effect | **Model 2a** Efficiency effect | **Model 3a** Labour recognition | **Model 4a** Profit rate | **Model 5a** Wage rate | **Model 6a** Exploitation |
| log GDP | 0.458\*\*\* | -0.0230\* | -0.0389\*\*\* | 0.677\*\*\* | 0.0735 | 1.850\*\*\* |
| log GDP p/c | 0.0655 | 0.0255\*\* | 0.0730\*\*\* | 0.716\*\*\* | 0.202\*\*\* | -1.164\*\*\* |
| Unemployment rate |  |  |  | 0.0229\*\*\* | -0.00132 | -0.0138\*\*\* |
| log K/L | 0.0877\*\*\* | 0.139\*\*\* | -0.262\*\*\* | -1.594\*\*\* | 0.229\*\*\* | -0.354\*\*\* |
| Agriculture | -0.000155 | -0.00158 | -0.00253\*\* | 0.0462\*\* | 0.00434 | -0.0291\*\* |
| Manufacturing | 0.00821\*\*\* | 0.000923\*\*\* | 0.000353 | 0.0196\*\*\* | -0.0049\*\*\* | -0.0143\*\*\* |
| Construction | -0.00358\*\* | 0.00104\*\*\* | 0.000802\*\*\* | -0.00257 | -0.00109 | -0.00592\* |
| Services | 0.000313 | 0.000187 | 0.000800\*\* | -0.00115 | -0.000730 | -0.00451 |
| Public sector | -0.0105\*\*\* | -0.000737 | -0.000579 | -0.045\*\*\* | 0.00891\*\*\* | 0.00496 |
| 2004 | -0.00540 | -0.00192 | 0.00249\*\* | -0.0187 | -0.000455 | 0.00980 |
| 2005 | -0.00964 | -0.00237\* | 0.00101 | -0.0231 | 0.00146 | 0.00169 |
| 2006 | -0.0242\*\*\* | -0.00352\*\* | -0.000923 | -0.0573\*\* | 9.94e-05 | 0.0185 |
| 2007 | -0.0392\*\*\* | -0.00441\*\*\* | 0.000452 | -0.097\*\*\* | -0.00104 | 0.0384\*\* |
| 2008 | -0.0371\*\*\* | -0.00542\*\*\* | 0.00441\*\*\* | -0.0381 | -0.0128 | 0.0333\* |
| 2009 | 0.00508 | -0.00752\*\*\* | 0.0183\*\*\* | 0.167\*\*\* | -0.0325\*\*\* | -0.0300 |
| 2010 | -0.0198\*\* | -0.0113\*\*\* | 0.0274\*\*\* | 0.149\*\*\* | -0.0487\*\*\* | 0.0270 |
| 2011 | -0.0341\*\*\* | -0.0137\*\*\* | 0.0301\*\*\* | 0.154\*\*\* | -0.0580\*\*\* | 0.0569\*\*\* |
| 2012 | -0.0302\*\*\* | -0.0160\*\*\* | 0.0350\*\*\* | 0.215\*\*\* | -0.0662\*\*\* | 0.0615\*\*\* |
| 2013 | -0.0276\*\*\* | -0.0174\*\*\* | 0.0396\*\*\* | 0.244\*\*\* | -0.0706\*\*\* | 0.0662\*\*\* |
| 2014 | -0.0348\*\*\* | -0.0178\*\*\* | 0.0398\*\*\* | 0.202\*\*\* | -0.0600\*\*\* | 0.0719\*\*\* |
| 2015 | -0.0469\*\*\* | -0.0200\*\*\* | 0.0413\*\*\* | 0.174\*\*\* | -0.0607\*\*\* | 0.0936\*\*\* |
| 2016 | -0.0557\*\*\* | -0.0200\*\*\* | 0.0398\*\*\* | 0.153\*\*\* | -0.0604\*\*\* | 0.101\*\*\* |
| Constant | -12.69\*\*\* | -0.392\* | 4.477\*\*\* | -4.339 | -5.937\*\*\* | -30.49\*\*\* |
| Number of  observations | 252 | 252 | 252 | 252 | 252 | 252 |
| R-squared | 0.873 | 0.920 | 0.969 | 0.827 | 0.794 | 0.910 |
| Hausman test | 56.79\*\*\* | 19.16\*\* | 67.21\*\*\* | 27.06\*\*\* | 18.66\*\* | 134.86\*\*\* |

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: Authors’ calculation.

*Table 3. The influence of the technological composition on the Eurozone's cross-country inequality (2003-2016)*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Dependent variable | **Model 1b** Price effect | **Model 2b** Efficiency effect | **Model 3b** Labour recognition | **Model 4b** Profit rate | **Model 5b** Wage rate | **Model 6b** Exploitation |
| log GDP | 0.575\*\*\* | -0.0217 | -0.0414\*\*\* | 0.334 | 0.0903 | 2.027\*\*\* |
| log GDP p/c | 0.0355 | 0.0441\*\*\* | 0.0817\*\*\* | 1.762\*\*\* | 0.0631 | -1.657\*\*\* |
| Unemployment rate |  |  |  | 0.0342\*\*\* | -0.002\*\*\* | -0.0182\*\*\* |
| log K/L | 0.105\*\*\* | 0.124\*\*\* | -0.264\*\*\* | -2.073\*\*\* | 0.283\*\*\* | -0.140\* |
| High technology | -0.00222 | 0.00205\*\*\* | 0.00134\*\*\* | -0.0190\* | -0.010\*\*\* | 0.0231\*\*\* |
| Medium technology | -0.00103 | 0.000866\* | -0.000182 | 0.00585 | 0.00139 | 0.000248 |
| Low technology | 0.0296\*\*\* | -0.000346 | -0.000343 | 0.0614\*\*\* | -0.0077\*\* | -0.0338\*\*\* |
| 2004 | -0.00539 | -0.00233\* | 0.00286\*\* | -0.0358 | -0.000436 | 0.0201 |
| 2005 | -0.00536 | -0.00310\*\* | 0.00221 | -0.0492 | 0.000888 | 0.0149 |
| 2006 | -0.0175\* | -0.0043\*\*\* | 0.00113 | -0.0914\*\* | -0.00204 | 0.0364\*\* |
| 2007 | -0.028\*\*\* | -0.0057\*\*\* | 0.00285\* | -0.125\*\*\* | -0.00457 | 0.0551\*\*\* |
| 2008 | -0.0272\*\* | -0.0067\*\*\* | 0.00685\*\*\* | -0.0739\* | -0.0140 | 0.0485\*\*\* |
| 2009 | -0.00611 | -0.0082\*\*\* | 0.0197\*\*\* | 0.0900\*\* | -0.0196\*\* | -0.00293 |
| 2010 | -0.0226\* | -0.0124\*\*\* | 0.0284\*\*\* | 0.0956\*\* | -0.037\*\*\* | 0.0431\*\* |
| 2011 | -0.0299\*\* | -0.0148\*\*\* | 0.0312\*\*\* | 0.128\*\*\* | -0.051\*\*\* | 0.0627\*\*\* |
| 2012 | -0.0254\* | -0.0164\*\*\* | 0.0365\*\*\* | 0.194\*\*\* | -0.062\*\*\* | 0.0683\*\*\* |
| 2013 | -0.0257\* | -0.0179\*\*\* | 0.0410\*\*\* | 0.223\*\*\* | -0.065\*\*\* | 0.0740\*\*\* |
| 2014 | -0.0340\*\* | -0.0184\*\*\* | 0.0414\*\*\* | 0.190\*\*\* | -0.057\*\*\* | 0.0806\*\*\* |
| 2015 | -0.0353\*\* | -0.0203\*\*\* | 0.0431\*\*\* | 0.183\*\*\* | -0.064\*\*\* | 0.0913\*\*\* |
| 2016 | -0.042\*\*\* | -0.0205\*\*\* | 0.0416\*\*\* | 0.158\*\*\* | -0.059\*\*\* | 0.0925\*\*\* |
| Constant | -15.98\*\*\* | -0.438 | 4.513\*\*\* | -1.355 | -5.496\*\*\* | -33.23\*\*\* |
| Number of  observations | 238 | 238 | 238 | 238 | 238 | 238 |
| R-squared | 0.774 | 0.913 | 0.964 | 0.710 | 0.743 | 0.901 |
| Hausman test | 45.46\*\*\* | 19.56\*\*\* | 63.88\*\*\* | 14.88\*\* | 16.14\*\* | 133.90\*\*\* |

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Source: Authors’ calculation.

1. The research confirmed that, throughout the analysed period, the disequilibrium prices were the main source of the Eurozone’s cross-country inequality. The study showed that the general characteristics of the individual member states are a crucial factor determining the country’s utilization of the existing price-market disequilibria. The countries proved to be differentiable with regards to their price positions and resulting effects. Accordingly, the countries of smaller size (measured by ) and countries with higher capital intensity exhibited their capability in obtaining higher prices for their commodities. This, in turn, positioned them in an above-average position regarding reaping the benefits arising from the Eurozone’s market (price) disequilibria. The analysis confirmed the results of authors’ previous study (Rubinić and Tajnikar, 2019b), by showing the strong deteriorating bias of price position of all Eurozone countries. The exception to this rule was the outbreak of the global downturn in 2009, which (although insignificantly) improved the Eurozone’s countries’ price positions.

With regards to the influence of the sectoral composition on the price positions, the increase in the economy’s manufacturing share has a positive effect. Contrarily, the increase in the shares of construction and public sector within the economy’s structure has decreased the respective country’s price position. The influence of the agriculture and service sectors remained unidentified. The performed analysis managed to explain as much as 87.3% of the countries’ price positions variation effected by the sectoral composition influence.

Similarly, a high explanatory power with respect to the countries’ price positions variability is obtained in the case of technological composition of national economies. In this case the result was rather surprising given that the analysis has shown that the higher share of less developed technologies advances the countries’ price positions.

1. When it comes to wages, the economic efficiency, encompassing labour productivity in addition to capital efficiency, is of special importance. It is undoubtedly confirmed that the economically efficient countries are those with higher capital-labour ratio, implying that the increase in the capital intensity is a prerequisite of high efficiency. However, throughout the period, the efficiency effect on the was of lesser significance when comparing it to the disequilibrium price effect (source 1). Moreover, the efficiency trend reported continuous decline over the period under examination, regardless of the crisis occurrence.

With the sectoral composition in question, the economic efficiency was significantly influenced by the manufacturing and construction shares. On the other hand, when the analysis included the technological composition differences, the results received were as expected, suggesting that the country’s efficiency is influenced by the level of technological development.

1. The empirical research has confirmed the assumption that the price and efficiency effects are reflected through wage rates. Given that the benefits of the price disequilibria and distinct efficiencies are disproportionately distributed amongst the member states, the wage rates must mirror the equivalent pattern. Therefore, as was the case in the utilization of the price and efficiency effects, the higher wage rates are reported within the more developed and higher capital intensity countries. In line with the deterioration of the disequilibrium prices, the wage rates are experiencing a decline from 2009 onwards.

It bears mentioning that the wage rates were influenced by the unemployment. This implies that a higher unemployment rate begets decline in wages and higher inequality. The results indicated that a higher unemployment rate equals a lower actual-to-equilibrium wage rate ratio. Unlike in the case of sectoral composition, the strong significance amongst wages and unemployment was detected in the case of technological composition.

The analysis of wage rates indicated the negative impact of the manufacturing sector, as well as the positive impact of the public sector. The public sector clearly forms higher wage rates, even though it reduces the countries’ price positions. The higher manufacturing shares also increase economic efficiency and enhance the countries’ price positions; however, this does not increase the wage rates.

The increase in the share of high technologies reported a negative effect on the wage rates. Such a result indicates that the majority of the analysed countries, from the viewpoint of prices, efficiency, and technological development, are in the position which, regarding international competition, does not allow for an increase in wages.

1. The fact that the wage rates and the profit rates are alternative factors enhancing the cross-country inequality gap, is additionally confirmed by the results of the profit rate analysis. The profit rates reported significant variation across countries with a negative influence of capital intensity. This means that the higher capital-labour ratio lowered profits. The bigger and more developed countries reported higher profit rates and, in contrast to the wages, the profits reported a continuous rise followed by the onset of the crisis in 2009.

In line with classical economics, the analysis has pointed out that the labour market is a main mechanism distributing the economic rewards towards the production factors. This becomes apparent once it is acknowledged that the wage and profit rates are significantly influenced by the unemployment rate. Therefore, as expected, the increase in the unemployment rate initiates the upward profit rate trend simultaneously with the downward wage rate movement.

The higher share of agriculture and manufacturing positively influences the profit rates, where the latter sector does so while concurrently enhancing countries’ efficiency and price positions. Conversely, profit rates are negatively influenced by the public sector share. Moreover, the higher share of less developed technology has a positive effect and increases the profit rates.

1. The cross-country differences and the factors causing them, particularly the ones connected to the economy’s sectoral composition and the firm’s technological development, are reflected within the factor that expresses the cross-country inequality in international value transfers. This factor, quantified as the ratio between the newly created value and the equilibrium national income, indicates the extent of the consumed labour recognition within the national income. The relationship between the new value created and the equilibrium national income is functionally defined through the capital intensity or the organic composition of capital. The importance of this relationship is empirically confirmed by the fact that the higher organic composition of capital requires less work to produce equilibrium national income. By extending on the conclusions made thus far, such a state of affairs works in favour of countries that are more developed (higher ) and smaller in size.

The rising share of construction and service activities within the national income decreases the quantities of consumed labour being recognized within the equilibrium . The opposite is the case with the agricultural sector. These movements are consistent with the technological influence, where the employment of the highly developed technology results in a lesser amount of labour being recognized within the equilibrium .

It bears mentioning that the results reported a statistical significance regarding the effects of the time variable. As shown, the amount of labour whose consumption is necessary for achieving the Eurozone’s equilibrium national income has been on a continuous increase from 2008 onwards. Such a conclusion is not trivial, especially if it is considered that concurrently with the increase in the necessary labour, the countries have shown substantial differences with respect to recognition of the new value created within the equilibrium .

1. The cross-country exploitation rate reported heterogeneity and an overall rising trend followed by the year 2011. The results suggested that the bigger countries, measured via , have a higher exploitation rate, i.e. that the increase in increase the exploitation rate. Such a result is predetermined by the nature of the data and becomes apparent when one is reminded that the lower tail of the Eurozone’s country-level distribution is exclusively reserved for the countries with comparably lower position and admitted to the European Union in 2004. These countries are: Slovakia, Lithuania, Slovenia, Latvia, Estonia, Cyprus, and Malta. The second conclusion, suggests that the increase in will result in the decrease in the exploitation rate. This, in effect, means that within the more developed countries workers spend more time working for themselves than they do for the production of a part of the income that is, in final instance, appropriated in the form of profit. Moreover, the analysis has shown that the rise in the unemployment rate will decrease the exploitation and that the same will hold in the case of rising capital intensity. This is reasonable since the unemployment rate inevitably assumes a decline in the labour that needs to be exploited, whereas the influence of capital intensity on the exploitation indicates that the workers who remained employed experienced, on average, a rise in their wages. However, the decline in the exploitation rate can be misleading in terms of a conclusion that the relative position of the workers has improved. This is not necessarily the case since such improvement can come at the expense of laying off numerous workers. In the latter case, the lesser exploitation occurs simultaneously with the rise in overall inequality.

The sectoral structure of national economies has a significant effect on the exploitation rate. The higher shares of agriculture, manufacturing, and construction activities result in the lesser exploitation and suggest that within the countries with these sectors, workers tend to work less for profits and more for their incomes.

A similar motion holds in the case of technological composition, where the higher share of low technology results in the lesser exploitation and more time spent for the production of the labour incomes. Conversely, a rise in the share of the high technologies results in the fact that the workers work more for the profits.

1. **CONCLUSIONS**
2. The disequilibrium prices are the root cause of the Eurozone’s cross-country inequality. They are improving the relative position of the countries bigger in size and those with higher capital intensity. With the increase in the manufacturing share and decrease in the shares of construction and the public sector, the country can enhance its relative price position and lower/increase the loss/gain arising from the international value transfers. Moreover, the increase in the country’s relative position can be achieved with the increase in the less technologically advanced sectors.
3. It is observed that the influence of the technological composition, as an indicator of the development of the national production process, has a higher level of explanatory power regarding the differences in efficiencies of national economies than is the case for sectoral composition. This suggests that the share of high technology within the sector, combined with the high capital intensity, is more important in determining countries’ relative positions, than the type of the sectors where it appears. The enhancing the country’s relative position is achievable through the expansion of the manufacturing and construction sectors.
4. The Eurozone’s persisting cross-country inequality is a result of the distinctive cross-country efficiency levels, as well as distinctive cross-country utilization of the disequilibrium prices occurring on the commodities’ markets. These factors are reflected through the wage rate dynamics. The countries with higher capital intensity have higher efficiency, their commodities achieve higher prices, and their labour achieves higher wage rates. The factors that are being expressed through disequilibrium prices and efficiency, after 2008, have a negative impact on wage rates. The sectoral influence on disequilibrium prices and efficiency are not expressed in accordance with the sectoral influence on the wage rates. That being said, the wage rates are an indisputable consequence of the relations within the national labour markets, where higher unemployment yields lower wage rates. The majority of the analysed countries, from the point of view of efficiency, price position, and technologies, is in a subordinate position with regard to competition, which prevents them from neutralizing the labour market impact on the wage rate.
5. The profit rates are positively correlated with the country’s developed and inversely connected with the country’s wage rates. The importance the latter relationship is especially observable when considering the labour markets, where the unemployment increase lowers the wage rates concurrently with the increase in profit rates, and *vice versa*. The rise in the manufacturing share, besides the higher efficiency and better price position, results in a profit rate increase. Accordingly, the countries with less advanced technologies and a higher manufacturing share obtain higher profit rates.
6. The individual Eurozone member states spend different amounts of work for the production of the unit of the equilibrium national income. Consequently, as indicated by the theory of unequal exchange, it can be concluded that the workers within the less developed countries are working for the incomes that are, in the final instance, reaped by the individuals in the more advanced member states. In particular, after the outbreak of the 2008/09 crisis, the less developed countries needed to invest more and more labour for the production of a unit of equilibrium national income. Higher shares of the construction and service sectors, and more developed technology, result in the lesser recognition of the consumed labour within the equilibrium , with significant across countries deviation.
7. Beginning from 2011, the employed are working less and less for the part of the that they appropriate in the form of their non-profit income (wages and public sector incomes). The more developed and the smaller the country, the more time its workers spent working for themselves. Moreover, this is consistent with the identified technological impacts. Additionally, the sectors that are crucial for the lowering of the exploitation rate, are sectors of agriculture and manufacturing, and other activities employing less advanced technology.

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1. Working paper, not to be cited or published. For all information regarding the paper contact the corresponding author, Ivan Rubinić. [↑](#footnote-ref-1)
2. For a detailed breakdown of the matter see Raffer (1987), Brolin (2007), and Lichtenstein (2016). [↑](#footnote-ref-2)
3. While the capital homogeneity is generally accepted, reduction of all labour to homogenous labour deserves a remark. This is partly justified by the fact that, in the developed stages of capitalism, the differences between the kinds of labour are diminished (Cohen, 1974), or as Marx (1847) writes: *“…as the division of labour increases, labour is simplified. The special skill of the worker becomes worthless. He [on average] becomes transformed into a simple, monotonous productive force that does not have to use intense bodily or intellectual faculties"*. Additionally, drawing on the assumption that the unit of labour produces the same value implies that the degree of the workers’ ability to produce the value is equally distributed across the countries. [↑](#footnote-ref-3)
4. The equilibrium (production) prices are considered the centres of gravity (Mariña-Flores, 1998). [↑](#footnote-ref-4)
5. In a monopoly state, unequal exchange comes as a result of cross-country profit rate differentials (Amin, 1976). [↑](#footnote-ref-5)
6. For the importance of differentiation see Nicolas (2011) and consider the implications of Schott (2004, p. 647). [↑](#footnote-ref-6)