THE INFLUENCE OF THE ECONOMIC CYCLE
ON EUROZONE CROSS-COUNTRY INEQUALITY DYNAMICS

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Abstract

The cyclical influence on inequality is investigated using the model formulated from the theory of unequal labour exchange, based on disequilibrium prices, capital-labour ratios, efficiencies, disequilibrium factor incomes, and exploitation. Empirical employment of the abovementioned categories allowed for clustering Eurozone countries according to corresponding trends. Findings indicated country-level differentiability regarding the utilisation of cyclical advantages. Since the countries did not share a cycle tendentially, a consequential asymmetrical benefit distribution caused divergence and cross-country inequality. The implications of these conclusions are acute for Eurozone sustainability, which must revise its flawed economic foundations with built-in destabilisers that divide its members and oppose the goals of effective single market integration.

JEL Classification: E3, F44, F02
Keywords: Economic Inequality, Economic Cycles, Unequal Labour Exchange

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1. Introduction

The objective of this study is to examine Eurozone cross-country economic inequality dynamics. This is achieved by employing a model founded on the conceptual framework of Unequal Exchange (Emmanuel, 1972) and common features of works within the Classical/Marxian tradition. In their previous work (Rubinić and Tajnikar, 2019), the authors of this paper, developed a theoretical model and displayed empirical findings for the claim that inequality is an inevitable consequence inherent to Eurozone structural arrangements. That having been said, it must be stated that the theoretical groundwork of this study is founded on the synthesis of the Marxist and the heterodox traditions, based on which the authors developed their model. The authors concluded that the Eurozone's persistent inequality stems from international trade, initiated by reinforcing tendencies arising from a country's distinct starting points[1] and their ability to capitalise on their competitive advantages. Given that the period for which the conclusions are drawn consists of various cyclical phases, within the present research, the authors have redeveloped the model by accounting for cyclical fluctuations.

This research originates from the hypothesis that Eurozone cross-country inequality is quantitatively and qualitatively (according to the sources) influenced by the cycle, i.e., there is a relationship between cyclical phases and accompanying inequality trends.

The significance of the cycle is analysed by raising two research questions: the first one examines the extent of the cyclical influence, while the second investigates the ways in which the fluctuation occurred. The aim is to determine the cyclically influential patterns that would enable trend-cycle decomposition and clustering of Eurozone countries according to similarities in the trends exhibited. The matter is subsequently addressed from two aspects: the economic categories through which the influence of cyclical fluctuation on inequality can be observed and the manner in which inequality movements caused by cyclical variation were exhibited.

The questions raised become crucial with the acknowledgement that rising cross-country inequality accounts for the majority of overall inequality (Milanović, 2016). This is paramount for the Eurozone, the countries of which are, through single monetary policy and fiscal constraints, effectively deprived of their ability to proactively manage economic affairs (Lapavitsas et al., 2012; Stiglitz, 2016). Cyclical influence on the Eurozone has a diverse effect, most apparent when the countries are hit by asymmetric shocks. In the absence of adequate structural arrangements, individual countries are forced to find recourse to internal devaluation

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1. This finding is consistent with the circular and cumulative causation principle (Mydral, 1957; Kaldor, 1970).

process, which disproportionately affects the periphery of the Eurozone and fosters inequality within it. Thus, the inequality-driven distinct gains/losses enjoyed/suffered by the countries result in the contradictory, asymmetrical capitalisation of membership integration that opposes the goals of an effective single market. The lack of supranational policies that would harmonise economic activity prevents downturns and asymmetric shocks and restores prosperity, interferes with the Eurozone's ability to provide orderly provisioning for all its members. This creates an environment in which the sources of integrational wellbeing are transmuted, by interaction, into generators of cross-country inequality. On these grounds, the study's theoretical insights will re-question the "One Size Fits All"[2] and the "Single Speed Europe" guidelines, the implementation of which is detrimental to the European project, since they combine countries' absolute/comparative advantages and existing cross-country inequalities. Further approval of such a stance is indirectly recognised by the European Commission (2017) in the "White Paper on the Future of Europe" and within the argument that *"policies enhancing competition and free trade may serve not to eliminate inequality, but to perpetuate it"* (Seretis and Tsaliki, 2012: 976).

The remainder of the research is structured as follows: Section two presents the literature overview; section three displays the theoretical model, while the section four discusses methodological aspects, empirical restrictions, and data sources. The fifth section identifies the economic cycle and presents its impact on Eurozone inequality dynamics. Finally, the sixth section concludes that Eurozone countries do not share cycles, which is equivalent to saying that cyclical fluctuations are cross-country inequality catalysts.

2. Literature Overview

The axis of this research evolves around the premise that capitalist development, led by commodity exchange laws, is unequal. It brings about, in opposition to the orthodox theory of international trade (Ohlin, 1993; Barro, 1997), inherent inequality and widens the gap between the centre and the periphery. The grounds for contradicting the mainstream theory are derived from the notion that unobstructed trade does not consistently return positive effects for all parties, meaning that there is a lack of expected cross-country convergence. This favours countries with an absolute advantage (Weeks, 2001; Shaikh, 2007), intensifies existing inequalities, and serves as the enduring force driving a wedge between the rich and the poor. Equally, uneven distribution of economic gains among trading partners results in the countries' division between a strong core and a dependent periphery. Building on the work of Veneziani and Yoshihara (2017), this un-equivalent benefit distribution is captured by the fundamental axiom called "labour force exploitation", the distinct levels of which, among trading countries, are the root cause of unequal labour exchange.

2. Wortmann and Stahl (2016) asserted that "One Size Fits Some" causing the single monetary policy to exacerbate cross-country inequality.

The concept of unequal exchange was introduced by Emmanuel (1972: 265), who considered it as an elementary value transferring mechanism that enables advanced countries to grow at the expense of less advanced ones[3]. Here, it must be noted that *"the richer country exploits the poorer one, even where the latter gains by the exchange"* (Marx, 1971: 106). When countries with distinct labour exploitation trade, with an underlying unequal exchange, the outcome entails that *"the surplus value produced in both regions [countries] is first thrown on a pile and then divided between the capitalists according to the amount of their capital. The capitalists of the more highly developed region [country] thus not only exploit their own workers, but also always appropriate a part of the surplus value that has been produced in the less developed region [country]"* Bauer (2000: 200).

This phenomenon is particularly intriguing with regards to the cycle, seen as a manifestation of the discrepancy between the capacity to produce and the capacity to consume (Amin, 1976: 92). According to Amin (1974: 609), unequal exchange theory was conceived by Prebisch, who considered the cycle as a typical form of capitalist growth[4]. Prebisch asserted that unequal exchange foundations are built on wage and profit differentials (Prebisch, 1950; Floto, 1989) and that income disparity between the core and periphery is created during such cyclical movement (ECLAC, 1951: 57). This reasoning suggested that, during the upswing, prices in the periphery rose more sharply than those in the core due to sectoral composition differences. Contrarily, during the downswing, peripheral prices experienced a steeper decline relative to those of the core. This was driven by declining demand in the core, inelasticity of demand for peripheral primary products (Singer, 1950), the perishable nature of primary goods as opposed to the core's manufacturing goods, higher rigidity of wages in the core, and monopolistic prices resulting in the core (Love, 1980: 59). Given that the core is well adapted to maintaining the values of its products at the desirable level, via trade, the downward price pressure moves towards the periphery. Hence, peripheral wages and profits are reduced resulting in exacerbating the terms of trade and purchasing power. This enables the core to derive a section of its wealth from the periphery via value transfer initiated by the unequal exchange.

Although Prebisch differentiated between the core and the periphery based on sectoral grounds, his foundation is related to the usage of distinct technology correlated with excess capital. Such rationale is remarkably consistent with the findings of this paper. The dire consequences of the dynamics mentioned enhance capital accumulation by the core and provide the foundations for the re-commencement of this vicious cycle, permanently holding the periphery as a hostage of concealed unequal exchange forces.

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3. For a detailed overview of the matter, see Brolin (2007), Lichtenstein (2016), and Cope (2019).
4. This belief is expressed in Prebisch's letter to Gudin in 1948. See Toye and Toye, 2003: 444.

Harvey (2006: 442) stresses that *"processes described allow the geographical production of the surplus value to diverge from its geographical distribution, in much the same way that production and social distribution separate"*. He concludes *"that the basis for crisis formation is broadened and deepened by the processes described"*. His argument, combined with that of Prebisch, makes cyclical influence both the mode of capitalist growth and the origin of its crisis. The emerging spiral, thus, perpetuates inequalities and raises the need for revision of the flawed structural design that favours affluent members at the expense of the entire integration.

Hitherto, the empirical analysis was performed mainly concerning input-output data. Several works of relevant literature are noteworthy: Baiman (2014) classified Germany as a prosperous unequal exchange economy. Seretis and Tsaliki (2016) concluded that persisting productivity differences give rise to an uneven playing field where absolute advantages enhance the competitive position of superior countries. Consequently, unequal exchange caused value transfer from Greece and Spain to the Netherlands and Finland. Tsaliki, Paraskevopoulou, and Tsoulfidis (2017) showed that, mostly due to higher capital intensity, asymmetric trade resulted in value transfer from Greece to Germany. Ricci's (2019) findings, consistent with this paper, concluded that the northern Eurozone and northern Europe have an influx of value transfer, as opposed to eastern Europe and (to an extent) the southern Eurozone. Lastly, Serrano, Molero-Simmaro, and Buendía (2016) investigated the crisis impact on European inequality and found that the distinct patterns generated by the recession affected Greece, Italy, Portugal, and Spain more severely than core countries.

By acknowledging the work performed, one can conclude that the cyclical influence on cross-country inequality via unequal exchange remains both relevant and under-researched. Consequently, the aim of this paper is to rectify the former and bring back to focus the topic that, in this age of globalization, deserves special consideration.

3. The Theoretical Model of Cross-Country Inequality

The study of the cyclical influence on inequality dynamics rests on the model founded on the Marxian intellectual landscape, modified through the novel use of linear economic models. The model, formally introduced by Rubinić and Tajnikar (2019), links Marx (1990) with the work of van Schaik (1976), Morishima (1973), and Newman (1962). The point of departure is the economy's material base, or what Marx (1990: 133) refers to as "physical bodies of commodities". This physical system is used to explain the genesis of physical surplus, defined as the net output of productive economy. Employing the physical system enables the authors to bypass the well-known deficiency related to Marxian economics, namely, the problem of transformation. This way, the physical surplus can be expressed through the price system

by multiplying the elements of physical surplus with prices. This yields the national income. Additionally, given it is a product of the labour invested, this physical surplus can be expressed through the value system, as the quantity of consumed labour. Such a formulation of physical surplus brings about the category of new value created (hereafter,). This introduction of value enables the investigation of the unequal labour exchange through distributional trade inequalities and sets the groundwork *"…for claim that systemic inequality lies beneath apparently free market relations"* (Dunn, 2017: 353). Consequently, the innovated model operates within the environment comprised of three coexisting systems, where the underlying physical system is mirrored in the price and value systems. Such a framework enables the investigation of exploitation phenomena and allows for the comparison between a country's effective labour consumption and social recognition of the labour consumed within the production process.

Initially, the application of Marx-based exploitation involves the inner-country study. However, through the adoption of specific assumptions, the Marx-based scheme can be extended to include the exploitative cross-country relations, where, in line with Emmanuel (1972) and Roemer (1982), the collections of agents are considered countries. On these grounds, considering the Eurozone, the aggregate national income[5] of all countries analysed is nothing but a price expression of the physical surplus produced within the Eurozone. Relatedly, since the physical surplus is the result of the labour consumed, the price expression of the Eurozone's aggregate national income must, by definition, equate the sum of money reflecting the Eurozone's NV (Gibson, 1980: 18). If such aggregate national income were to be distributed via markets and international trade in proportion to the country's consumed labour, then the country's national income would mirror the country's NV. For this to hold, international trade must be conducted in a way that ensures that the labour consumed in all trading countries is recognised, in its entirety, within the individual national incomes of all parties involved. This necessitates equality among the countries' national incomes and the NVs, and entails that Eurozone countries, among themselves, exchange commodities and values by following the principle of equal exchange of labour.

The deviation from the outlined pattern comes as a result of the fact that the Eurozone countries are at advanced stages of the capitalist mode of production, where national income is distributed according to the means of production and labour invested, between the capitalists and the labourers, and not in accordance to the NV. Thus, the country-level distribution of the Eurozone's output must account for, in addition to the labour consumed, the capital employed. Due to this, the labour

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5. The theoretical category of the national income is quantitatively expressed via the gross domestic product.

consumed within certain countries is not fully recognised within their national incomes, nor within their *NV*s. Their unrecognised labour content is appropriated by the remaining trading partners and forms a basis for cross-country inequality, defined through the discrepancy between the countries' consumed labour and recognized labour.

To summarize, the actual national income of a given country may lag or exceed the country's NV and, therefore, may not reflect the total quantity of the country's labour consumed. According to the model used, this situation can be described as the outcome of three determinants: distinct utilisation of market disequilibria, distinct organic composition of capital, and distinct levels of economic efficiency.

3.1 The Influence of Market Disequilibria

The 1986 Single European Act (European Commission, 2012) integrated the Eurozone countries via a single market, guaranteeing the free movement of goods, capital, services, and labour. Such a strategy seeks to create a territory free from regulatory obstacles which would purportedly 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 equalizes factor prices via the creation of uniform cross-country profit and wage rates, while the second establishes long-run equilibrium (production) price as the centre of gravity (Mariña-Flores, 1998). This entails the equivalence of cross-country factor rewards and the elimination of the economic incentive for factor re-allocation. Within such equilibrium, the Eurozone's aggregate gross domestic product (hereafter, *GDP*) would be distributed according to the equilibrium (production) prices of commodities and services sold within individual countries. However, due to the (among others) monopolies[6], imperfect competition, commodity differentiation[7], and non-price competition, economic reality deviates from the theoretical long-run equilibrium. Accordingly, certain members fail to obtain equilibrium prices, while more successful ones receive above-equilibrium prices for commodities and services sold. Thus, the latter countries obtain above-average profit and/or wage rates, whereas the former ones obtain below-average profit and/or wage rates.

In this sense, unequal exchange, as the market disequilibria outcome (Ricci, 2019), leads to divergence and becomes the first source of the Eurozone's cross-country inequality. The influence of disequilibrium prices on economic performance is quantitatively investigated through the variation between countries' actual

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6. In a monopoly state, unequal exchange comes as a result of cross-country profit rate differentials (Amin, 1976).
7. For the importance of differentiation, see Nicolas (2011) and consider the implications of Schott (2004: 647).

and equilibrium *GDPs*. The reasoning behind choosing this ratio is straightforward, given that the actual *GDP* (most likely) consists of disequilibrium prices, while the equilibrium   (hereafter, GDP_{pc}) consists of equilibrium (production) prices computed by distributing the Eurozone's aggregate *GDP* among countries, according to the equilibrium profit and wage rates. It suffices to mention that, for the countries benefiting from market disequilibria, the rationale used can be seen as an extension of Marx's monopoly (imperialist) rent (1991: 910), defined as the difference between the price of production and the market (actual) price (McKeown, 1987:67; Amin, 2011:20).

3.2 The Influence of Capital-Labour Ratios

With the onset of capitalism, cross-country *GDP* distribution must reflect returns on capital, without which production cannot be realised. Thus, the countries' appropriation of the aggregate *GDP*, in addition to the labour consumed, must account for the capital employed. Accordingly, even if market prices are aligned with long-run equilibrium, guaranteeing equal factor rewards across countries, because of country-specific capital-labour mix, the *GDP* appropriated by an individual country will not be proportionate to its consumed labour.

Consequently, countries that have less capital, per unit of labour, than the Eurozone average, have a higher *NV* than the GDP_{pc} and vice versa. A comparably higher *NV* within countries with less capital occurs because their commodities embody more of the labour consumed than what the countries with abundant capital do. This is what Emmanuel (1972) defines as the unequal exchange in a broad sense, arising from different capital intensities and transferring values toward the countries with high capital-intensive industries. This is how the process is recognised by Fine and Saad-Filho (2010: 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, Paraskevopoulou, and Tsoulfidis, 2017). Therefore, the countries with an average capital-labour ratio yield a GDP_{pc} equivalent to the labour consumed relative to the Eurozone's total consumed labour. A deviation of the countries' capital-labour ratios from the across-the-board-average causes a deviation of the GDP_{pc} from the *NV*, and the countries' consumed labour, accordingly. This is brought about as a straightforward consequence of the structural arrangements of the capitalist mode of production, in which the division of economic output rests on class antagonism.

3.3 The Influence of Economic Efficiency

Previous categories are based on actual levels of the production factors employed, even though labour productivity and capital efficiency may vary across countries. To capture the distinct efficiency's impact, measured as the cumulative influence of labour productivity and capital efficiency, the authors employ the category of efficient equilibrium *GDP* (hereafter, GDP_u). For the calculation of the GDP_u, the authors use the average consumption of labour per unit of *GDP* and the average consumption of capital per unit of *GDP* for the entire Eurozone. Employment of average values allows for the computation of a country's GDP_u received by considering actual wage and profit rates and average consumption of labour and capital per unit of *GDP*. Crucially, GDP_u omits cross-country differences in market prices, whereas, through the implementation of efficiency influence, the authors eliminate the influence of capital-labour ratios. Finally, the countries' positions with respect to economic efficiency are measured through the GDP_{pc} to GDP_u ratio.

The above-stated determinants are the drivers of trade inequalities and generators of the Eurozone's unequal labour exchange. On these grounds, the Eurozone's value transfers occur due to cross-country exchange of commodities with vastly different amounts of embodied labour. The resulting unequal labour exchange becomes apparent as the discrepancy between the country's actual *GDP* and the *NV*, and is, subsequently, reflected in cross-country divergence of production factors' remuneration and labour force exploitation.

3.4 Formation of Wage and Profit Rates

Equilibrium prices are calculated using equilibrium wage and profit rates. A given country experiences above equilibrium wage rates if their commodities and services reach prices exceeding the equilibrium. For such a country, the actual *GDP* must surpass the GDP_{pc}, as this positive difference is a source for financing such 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 equilibrium rates. Accordingly, this dynamic in a cross-country setting is externalised through lower wage rates, lower profit rates, or, in the worst-case scenario, both.

The extent to which the countries' failure to reach equilibrium prices is manifested in the wage and profit rates depends entirely upon the inner-country economic circumstances. In this respect, the authors argue that special weight must be assigned to national labour force markets. Relatedly, the countries realising equilibrium factor prices concurrently with a lower organic composition of capital may suffer a lower actual *GDP* (sum of capital and labour income). This may be the case even if the countries in question have above-average profit rates if the lower actual *GDP* is a consequence of the comparably lower cross-country capital stock. Additionally, these countries can also realise a comparably lower *GDP* per employee.

Lastly, all interactions stated above can be directly measured by implementing the labour force exploitation rate. In this manner, the model applied can connect labour force exploitation with unequal labour exchange and cross-country inequality.

3.5 Labour Force Exploitation

If the aggregate Eurozone's *GDP* is distributed by acknowledging the labour used, the individual countries' *GDPs* would be proportional to the labour consumed within production. The latter represents the price expression of the consumed labour that yields the monetary expression of the *NV* (Marx, 1990). On this basis, given that all categories are expressed in price terms, the *NV* can be compared to the total labour income. The labour income share of the *NV* is a source of two indicators. First, it points to how much of the country's consumed labour is being used for generating labour incomes. Second, it is an indicator of how much of the country's used labour is appropriated by capital in the form of profit. According to Morishima (1973: 51), the ratio between the labour time used for the production of profit incomes and the labour time used for the production of labour incomes points out the labour force exploitation rate (*e*). Formally,

$$e = \frac{\text{Surplus value}}{\text{Value of labour power}} = \frac{\text{Surplus labour}}{\text{Necessary labour}} = \frac{\text{Unpaid labour}}{\text{Paid labour}} \quad (1)$$

By incorporating this reasoning in the present study, the exploitation rate is calculated as

$$e = \frac{NV - W}{W} \quad (2)$$

Where *W* denotes total labour income comprised of wage income and the entire public sector. The higher the *e*, the more of the workers' labour time is spent on production of profits, which are being appropriated by capital due to ownership of the means of production.

4. Methodological Issues, Model's Restrictions, and Data Sources

The useful property of the Eurozone's unequal labour exchange theoretical model is that it can be straightforwardly quantified. It is worth mentioning that the foundation of the abovementioned model is Marx-based cross-sectoral analysis. However, given that the Eurozone is comprised of countries integrated via a common currency and a single market, it represents an ideal institutional design that allows for the assumption that the national and the international markets operate in a similar manner. Conditioned upon unrestricted factor mobility, a single monetary system, the development of the credit system, and the shared institutional setting, the

inquiry into the Eurozone's international transfer mechanism can be adequately carried out. Moreover, the approval of such a stance is found in Marx (1991: 442) who writes: "...*whatever is true of foreign trade holds also for commerce within a country*". Hence, the empirical study rests on the assumption that inequality is generated within the Eurozone, whose countries are, in line with Seretis and Tsaliki (2016: 445), treated as if they represent the total international market[8]. On this basis, the research sample size includes Eurozone countries apart from Luxembourg (omitted due to data limitations) and covers the period between 2003-2014.

The groundwork of this study is the functional income distribution that results from the formation of factors, which are, in accordance with the Marxian theory, considered homogeneous, competitive, and mobile. The labour force is expressed as the total number of the employed aged 20 to 64 (Eurostat, 2018a), thus implicitly assuming all labour participates in the value creation process. The capital is estimated using the standard perpetual-inventory method (Berlemann and Wesselhöft, 2014) as

$$K_t = K_0(1-\delta)^t + \sum_{n=0}^{t-1} I_{t-n}(1-\delta)^n \qquad (3)$$

where K_t denotes the capital stock in year t, K_0 represents the initial capital stock, δ is the capital depreciation rate, and I_{t-n} denotes the annual investment in year $t-n$. K_0 is calculated, according to Harberger (1978), by using the "stockcapit" command in Stata (Amadou, 2011). Data on investment (GFCF) are derived from the World Bank (2018) and expressed in 2011 Purchasing Power Parity $ (hereafter, PPP $) by using official conversion factors. Given that the conversion factors are *GDP*-based, investment data are adjusted by the price index ratio of investment goods to *GDP* (PWT 9.0, 2018).

To derive specific factor incomes, the authors used the United Nations' (2018) income approach to

$$GDP = COE + GOS + GMI + T_{pm} - S_{pm} \qquad (4)$$

where *COE* is the compensation of employees, *GOS* is the gross operating surplus, *GMI* is the gross mixed income, T_{pm} is taxes, and S_{pm} is subsidies[9]. *GDP* division, according to specific incomes, was done by computing profit income and taking labour income as residual. Profit income is the sum of *GOS* (income earned by enterprises) and the share of the *GMI* produced by private enterprises. Given that the United Nations does not report *GMI* according to its source, specific shares are

8. Regan's (2015: 5) supporting argument states that "*the Eurozone is a semi-closed economy area with less than 10% of trade leaving the Eurozone and predominantly going to other countries in the EU*".
9. Subscript *pm* denotes production and import.

obtained assuming that the *GMI* consists of an equivalent capital-labour ratio as the rest of the economy[10]. Respectively, total labour income encompasses *COE*, a part of *GMI* produced by self-employed agents, and the public sector (T_{pm} - S_{pm}). This yielded specific *GDP* income weights. Finally, in order to estimate total profit and labour incomes, the weights obtained were multiplied by the *GDP* retrieved from the World Bank (2018) and expressed in 2011 PPP $.

5. Results-Based Implications and Synthesis of Main Findings

The Eurozone countries, bound by the shared market, a common institutional setting, and numerous collective economic policies, with disparate levels of development and technology, represent an ideal group for investigating the cyclical influence on cross-country performance. Here, economic cycles are defined as the economy's deviation around its hypothetical steady state, or, to paraphrase Burns and Mitchel (1946: 3), the fluctuations in aggregate economic activity consisting of expansions, followed by recessions, contractions, and revivals, which merge into the expansion phase of the next cycle.

Consequently, analysis of the cyclical indispensability with regards to inequality determinants departs from the identification of the Eurozone's economic cycle.

**Figure 1.** Dating the Eurozone's economic cycle (2003-2014).
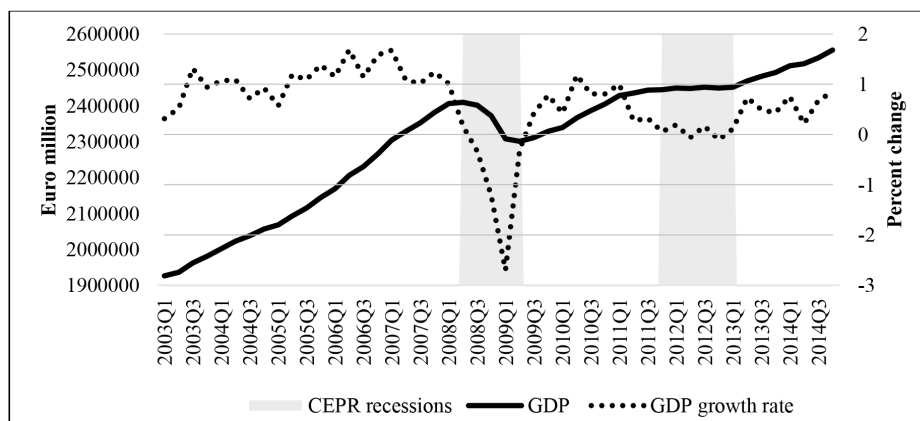
Source: Authors' calculations based on Eurostat (2018b) and CEPR (2018).

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10. Other differentiation methods (Guerriero, 2012) either underestimate or overestimate income shares.

As depicted, the Eurozone's *GDP* and *GDP* growth rate trends follow sequential patterns indicating a cyclical presence. The output surge suggests the occurrence of the expansion predating the recession that began in the 2nd quarter of 2008. Upon reaching the trough observed in the 3rd quarter of 2009, a performance trend commenced with its second rise, present until the end of the period observed. Prosperity re-appeared in three phases underlined by the steady, modest recovery resulting in reaching a pre-recession performance in 2011. The figure's shaded areas show recession phases as reported by the Centre for Economic Policy Research (hereafter, CEPR). CEPR data suggest that the Eurozone had two recessions. Regardless of this, throughout this paper, the focus is placed on the effects that the 2008 recession (hereafter, crisis) had on cross-country inequality. The justification of such a stance is the consequence fact that these results are based on the Eurozone's aggregate data with significant country-level heterogeneity. A further supportive argument lies in the notion that a third of the countries analysed, accountable for 50% of the average aggregate *GDP*, did not report negative growth within the period of the second CEPR recession.

Having achieved the cycle identification, the analysis moves on to investigating the cyclical influence on **market disequilibria** and its role in creating Eurozone unequal labour exchange. The influence of market disequilibria, investigated as the actual *GDP* to GDP_{pc} ratio, results in the Eurozone's four group clustering based on pattern similarity criteria.

**Figure 2.** Cyclical influence on the countries' market position (2003-2014).
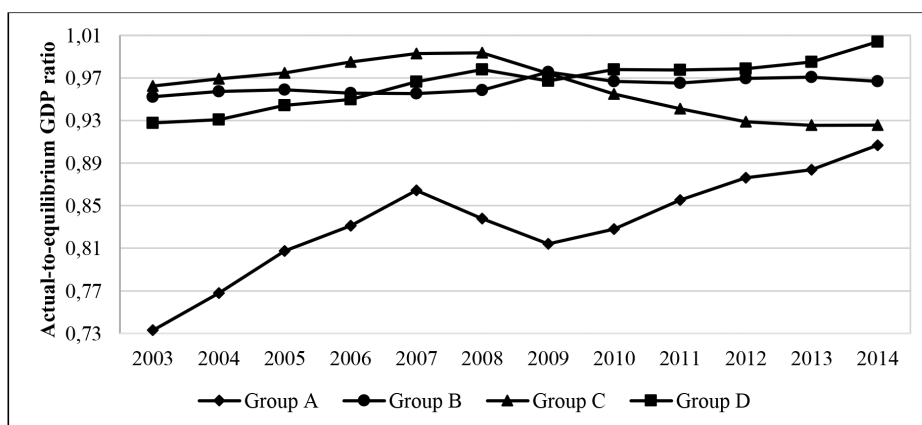
Source: Authors' calculations.
Note: Group A: Estonia, Ireland, Latvia, and Lithuania; Group B: Austria, Belgium, France, Portugal, and Spain; Group C: Cyprus, Finland, Greece, Italy, and Slovenia; Group D: Germany, Malta, the Netherlands, and Slovakia.

The cyclical influence via disequilibrium prices is especially observable within countries that were rapidly improving their relative pre-crisis positions (Groups A and C). The post-crisis change initiated the opposite effect and has led to a two-fold classification. The first group (Cyprus, Estonia, Greece, Latvia, Lithuania, and Slovenia), with below-equilibrium prices, experienced pre-crisis price level convergence leading to the enhancement of its relative position. The second group (Finland, Ireland, and Italy) also enhanced its relative pre-crisis position but did so by further utilising its above-equilibrium prices. The Eurozone's pre-crisis cross-country convergence resulted from the fact that the growth of the peripheral countries exceeded that of core countries during the cycle's expansion phase (Stiglitz, 2016; Matthijs, 2016). Hence, the cross-country inequality started to decline in the early 2000s with a reversing trend inflicted by the crisis. After 2009, Estonia, Ireland, Latvia, and Lithuania (Group A) returned to the positive price effect trajectory. Cyprus, Finland, Greece, Italy, and Slovenia (Group C) failed to recapture their pre-crisis levels and either retained the disequilibrium prices or experienced minor worsening. Group B representatives did not experience considerable market position deviation, while Group D improved their position with marginal cyclical influence.

The cyclical influence on **capital-labour ratios** is investigated through the relationship between the NV and the GDP_{pc}, and highlights the cross-country influence of the organic composition of capital on the GDP. Because the analysis includes GDP_{pc}, the measurement is unaffected by price fluctuations. Acknowledging distinct capital-labour ratios as the source of inequality leads to the identification of three groups of countries.

Figure 3. Cyclical influence on the countries' capital-labour ratios (2003-2014).
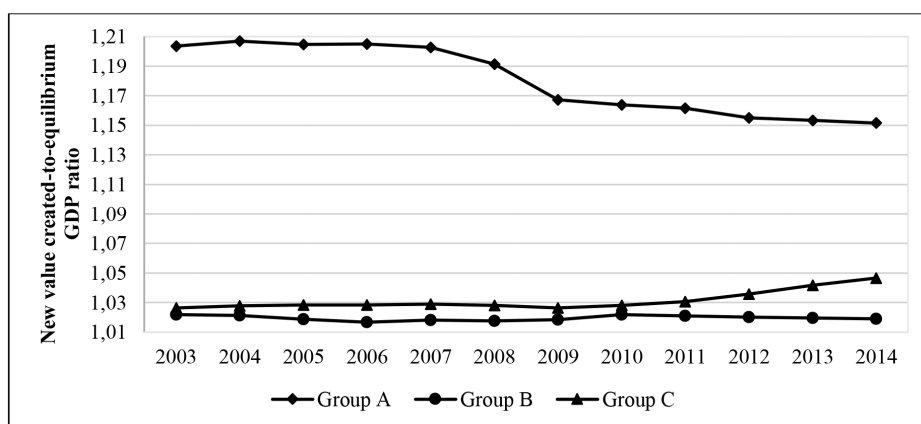
Source: Authors' calculations.
Note: Group A: Estonia, Finland, Greece, Latvia, Lithuania, Slovakia, Slovenia, and Spain; Group B: Austria, Belgium, Cyprus, France, the Netherlands, and Portugal; Group C: Germany, Ireland, Italy, and Malta.

The crisis impact on capital-labour ratios on *GDP* appeared in 2007 and stabilised in 2009. The greatest influence measured was within Group A. The crisis has reduced the GDP_{pc} less than it reduced the *NV*. Therefore, the *GDP* was reduced simultaneously with the decrease in the amount of consumed labour not recognised in the GDP_{pc}. Given that a higher share of the consumed labour was recognised within the GDP_{pc}, one may conclude that the crisis decreased Eurozone inequality. However, this is not the case, since the alterations came as a result of the increase in the capital-labour ratio initiated by the crisis-led drop in the number employed[11].

Slovakia and Slovenia diverge from this interpretation. Their capital-labour ratios increased throughout the period, even though the crisis affected the consumed labour recognition. This was possible since, in the case of Slovenia, returns on labour and capital fluctuated following the crisis (Figures 5 and 6), whereas in the case of Slovakia, fluctuation occurred with respect to returns on capital (Figure 6). Special status characterises Finland, which reported continuous decrease of the labour recognition linked to a steady capital-labour ratio increase. This reduction of labour recognition was related to a concurrent increase in return on labour and decrease in return on capital (Figures 5 and 6).

Regarding the recognition of labour used within the GDP_{pc} (Figure 3), Group B (Austria, Belgium, Cyprus, France, the Netherlands, and Portugal) has not been affected by the crisis. This group is characterised by a high capital-labour ratio and a high level of market recognition of labour expended. Austria, Belgium, France, and the Netherlands exhibited stable capital-labour ratio trends. Within these countries, the crisis influence was not reflected on either capital-labour ratio or on returns on capital (Figure 6). The crisis manifested itself in the returns on labour (Figure 5), which did not significantly affect the capital-labour ratio, nor the market's recognition of labour used.

Cyprus and Portugal diverged from the rest of the group. For this duo, the crisis became apparent through the fluctuation of a considerably lower capital-labour ratio. The stability of the recognition of labour used, as well as its effect on the *GDP* per employee, was maintained through variations in returns on labour and on capital.

Finally, Group C (Germany, Italy, and Malta) steadily increased its labour recognition during the period analysed and experienced balanced capital-labour ratios. Germany and Italy had significantly influenced the average values of the entire sample size, whereas Malta experienced the crisis influence, regarding the recognition of labour, through moderate variation in the return on labour.

The cyclical influence on **economic efficiency**, measured as the ratio of GDP_{pc} over GDP_u, trisected Eurozone countries. This necessitates a digression. Theoretical assumptions restrict the analysis of the overall efficiency level. Thus, efficiency becomes the clustering determinant with respect to cumulative labour productivity and capital efficiency.

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11. This is the outcome of the Eurozone's structure, which constrains its members to cope with the crisis through the adoption of the labour market supply-side reforms.

Figure 4. Cyclical influence on the countries' economic efficiency (2003-2014).
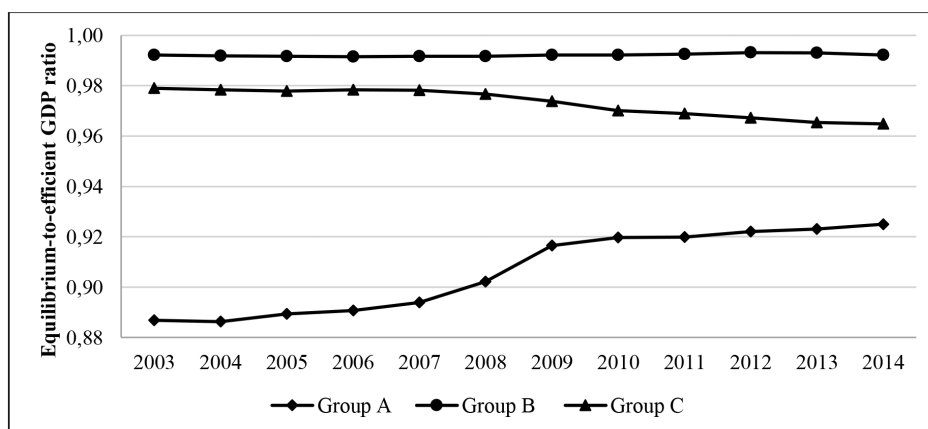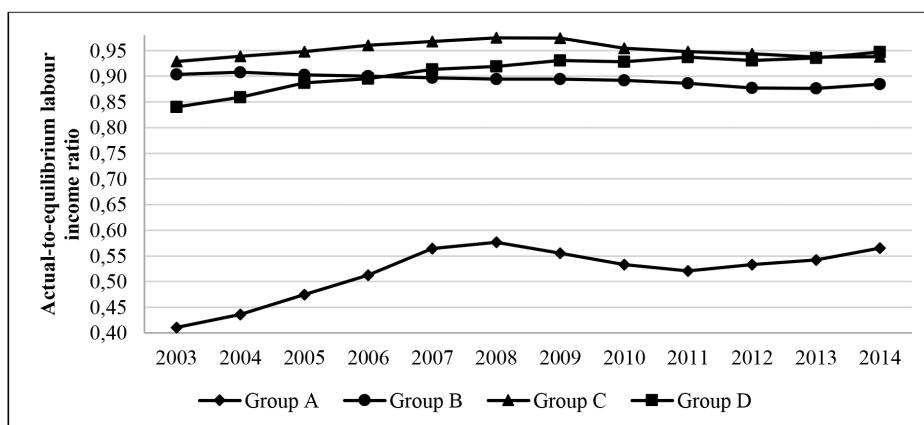
Note: Group A: Cyprus, Estonia, Greece, Latvia, Lithuania, Slovakia, and Slovenia; Group B: Austria, Belgium, Finland, France, Germany, Italy, the Netherlands, Portugal, and Spain; Group C: Ireland and Malta.

Regarding efficiency, Group B (Austria, Belgium, Finland, France, Germany, Italy, the Netherlands, Portugal, and Spain) performed the best, whereas Group C (Ireland and Malta) reported a declining efficiency trend throughout the period.

The cyclical influence was observed within Group A (Cyprus, Estonia, Greece, Latvia, Lithuania, Slovakia, and Slovenia), which had the lowest efficiency levels. The crisis influence has led to a break in the upward efficiency trend. Group B steadily maintained high efficiency levels, while the lagging countries of Group A had converged within the pre-crisis period. Such convergence lasted throughout the reference period for some countries, while the remaining countries experienced trend slowdown and stabilisation on a higher efficiency plane.

The cross-country convergence/divergence presented, caused by the determinants of unequal labour exchange and influenced by the cycle, initiated a direct cross-country spill-over apparent through the deviation of **profit and labour incomes** from their equilibrium levels.

The cyclical influence on the formation and dynamics of labour incomes (investigated as the sum of gross wages and public sector expenditure) divided the Eurozone into four groups.

Figure 5. Cyclical influence on labour income formation (2003-2014).

Source: Authors' calculations.
Note: Group A: Estonia, Latvia, and Lithuania; Group B: Germany, Italy, Malta, Portugal, and Spain; Group C: Austria, Belgium, Cyprus, France, Greece, and Slovenia; Group D: Finland, Ireland, the Netherlands, and Slovakia.

The pattern recorded is similar to that of Matthijs (2016), which indicates that during the upturn of the economic cycle, peripheral labour incomes rose much faster than core labour incomes. On the contrary, during the burst, peripheral countries experienced severe wage cuts. It is worth stressing that the wage cuts observed can be related to the internal devaluation process, initiated by the cyclical asymmetric shocks, which affect the periphery disproportionally, because of its economic dependence, as established within the structuralist theories.

Albeit less differentiable, the cyclical influence on profit income formation also separated the Eurozone into four groups.

Figure 6. Cyclical influence on profit income formation (2003-2014).
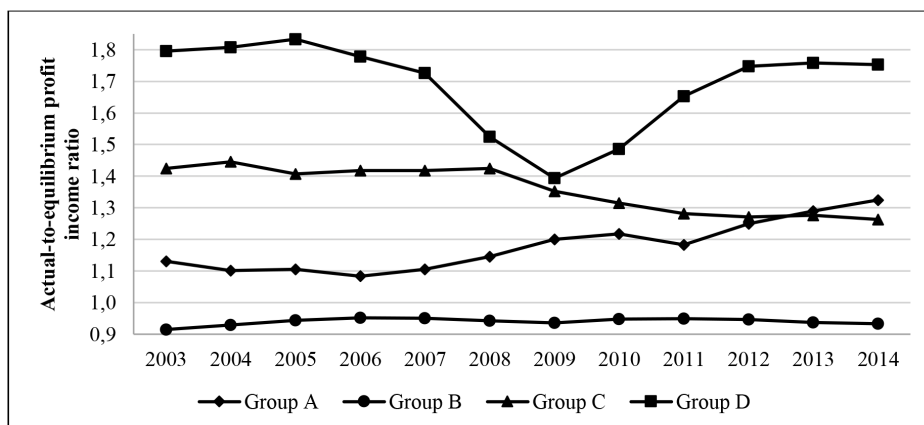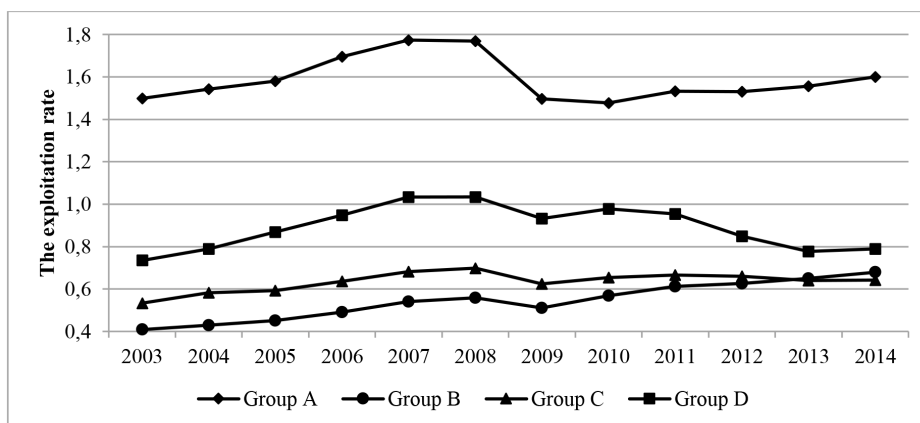
Source: Authors' calculations.
Note: Group A: Malta, Portugal, and Spain; Group B: Austria, Belgium, France, Germany, and the Netherlands; Group C: Cyprus, Finland, Greece, Italy, Slovakia, and Slovenia; Group D: Estonia, Ireland, Latvia, and Lithuania.

In Estonia, Latvia, and Lithuania, price imbalances were transferred in terms of profit and labour incomes. Their price levels, profit incomes, and labour incomes reached pre-crisis levels in 2014. The unique representative is Ireland, which did not compensate for the burden of crisis by lowering labour incomes (which increased relative to the equilibrium). The Irish crisis became evident with the significant profit income drop. Their pre-crisis profit level was exceeded in 2012, as a result of continuous positive growth initiated in 2008.

Countries unsuccessful in the post-crisis utilisation of relative price disequilibrium positions (Figure 2, Group C: Cyprus, Finland, Greece, Italy, and Slovenia) expressed their failure through both income trends. The exception is Finland whose labour incomes continuously increased and whose losses due to disequilibrium prices were expressed through declining profit incomes relative to the equilibrium. Regardless of this exception, the group's significance lies in the fact that the decline of 2008 was less pronounced and that losses occurring due to disequilibrium prices lasted until 2012.

The remaining countries in Figure 2 are distinguishable based on the absence of the cyclical influence on the countries' market position. Group B reported unchanged actual prices relative to the equilibrium. In Austria, Belgium, and France, the crisis was reflected in disequilibrium labour incomes (Figure 5) with profit incomes remaining stable (Figure 6). Deviation occurred in the case of Portugal and Spain (Figures 5 and 6). This duo reported stable price ratios and unnoticeable cycle effects. However, trends within these neighbouring countries reported that labour incomes declined with the simultaneous rise of profit incomes. Group D is characterised by continuous relative market position improvement, regardless of the recession (Figure 2). Improvement resulted in the rise of labour incomes within the Netherlands and Slovakia. In the latter case, the rise occurred simultaneously with profit income decline (Figures 5 and 6). Malta was the exception, since the effects of the crisis manifested themselves in the increase of profit income. Lastly, Germany did not express improvement of its market position (utilisation of market price disequilibria) through profit or labour income alteration.

Finally, the overall cyclical influence of all categories affecting unequal labour exchange is indicated through the **labour force exploitation rate**. Calculated via the procedure of equation (2), the exploitation rate divided the Eurozone into four groups. The peculiarity of this inequality source is that all groups report the crisis effect and subsequent growth revival.

Figure 7. Cyclical influence on the countries' labour exploitation rates (2003-2014).

Source: Authors' calculations.
Note: Group A: Estonia, Ireland, Latvia, Lithuania, Portugal, and Slovakia; Group B: Austria, Belgium, France, Germany, and Malta; Group C: Finland, Italy, the Netherlands, and Slovenia; Group D: Cyprus, Greece, and Spain.

Group A (Estonia, Ireland, Latvia, Lithuania, Portugal, and Slovakia), comprised of countries with comparably smaller *GDPs*, stands out with the highest exploitation rate. Here the workers employed worked, on average, 1.6 times more, producing profit incomes, than they did to produce labour incomes. Furthermore, in the expansion phase (2003-2008), the group's exploitation rate experienced a surge halted by the crisis onset, whereas the subsequent growth revival repeatedly triggered the rise of the exploitation rate. In the case of Group B (Austria, Belgium, France, Germany, and Malta), with comparably larger *GDPs* and the lowest reported values, the exploitation rate was increasing throughout the entire reference period. The exploitation rate of Group C (Finland, Italy, the Netherlands, and Slovenia) was highly stable with values at the end of the period lower than those of Group B, with the lowest overall exploitation. Within Group D (Cyprus, Greece, and Spain), the exploitation rate experienced rapid pre-crisis growth as well as a decline in 2008. In this group, the production factors were predominantly equally rewarded, i.e., half of the labour time was spent on producing profit and half on producing labour income. As opposed to Group A, Group D did not return to the upward trajectory and remained stable until the end of the period observed.

6. Conclusion

Cyclical influence via market disequilibria (utilization of the market disequilibrium position) is not significant for the whole of the Eurozone. Some members,

predominantly those with below-equilibrium prices, were severely affected by the cycle. A few others kept their actual-to-equilibrium price ratio unchanged, i.e., the price effect did not indicate the cyclical influence. Major inequality alterations regarding equilibrium prices occurred where the impact of the cyclical fluctuation on the categories investigated was experienced. In countries with below-equilibrium prices, inequality with other countries decreased within the expansion phase. On the contrary, the crisis increased inequalities in the market position due to relative worsening within the countries with below-equilibrium prices. Accordingly, cross-country inequalities in terms of a country's market position were lowered by the expansion phase and increased by the following crisis.

Fluctuations of actual prices around the equilibrium were a fundamental factor determining functional income distribution variation. These fluctuations manifested themselves through changes in a country's labour incomes, profit incomes, or both. Labour income alterations, in, reflected a changing pattern in the country's market position. Indeed, results indicate cross-country labour income convergence within the expansion, as well as divergence inflicted by the crisis. Such an outcome is the consequence of a market position reversal driven primarily by changes in the positions of countries with below-equilibrium prices. The market dynamics of these countries was a key driver of inequality, even with respect to profit rates, where countries with a worse market position reported above-average profit rates. Cross-country deviation in profit rates was highest within the expansion, while its radical decrease occurred during the contraction.

The crisis has either directly, via capital-labour ratios, or indirectly, through returns on capital/labour, influenced distinct cross-country recognition of the labour used. Differences were driven mainly by changes within the countries with low recognition of labour used and low capital-labour ratios. The crisis influenced the countries with a higher capital-labour ratio to a lesser degree and led to a reduction in *GDP* per employee in the countries with low capital-labour ratios. The fluctuations of the capital-labour ratios brought on by the crisis are reflected through the lower market share of the countries' consumed labour recognition. Consequently, the decrease in the part of the labour not recognized within the *GDP* reduced cross-country inequality measured as the market recognition of the labour used.

Highly efficient countries did not report significant efficiency fluctuations. On the contrary, low efficiency countries (Greece, Cyprus, Slovenia, Estonia, Latvia, Slovakia, and Lithuania) showed trends highly influenced by the cycle and the crisis. These countries reported a radical efficiency rise followed by the outbreak of the crisis in 2008. After 2009, their efficiency stabilised at a higher level. In effect, this led to a substantial crisis-led decrease in cross-country inequality measured via economic efficiency.

The labour exploitation rate unveiled great cyclical influence. Cross-country inequality was primarily driven by exploitation rate alterations within Estonia, Ireland, Latvia, Lithuania, Portugal, and Slovakia. The overall exploitation intensified during the Eurozone's expansion phase, albeit to a higher degree within these countries. When the crisis emerged, this dynamic shifted, and exploitation decreased. Consequentially, the exploitation rate inequality experienced an expansion-led increase and a crisis-led decrease. This becomes apparent as the outcome of the decrease in the number employed and *NV*, as well as the reduction of profits within the contraction phase. The joint effects of the above were a drop in the labour employed for profit creation and a consequential downward trend of labour exploitation.

The cycle and the crisis divide the Eurozone into two groups. The first group (Cyprus, Estonia, Greece, Latvia, Lithuania, Portugal, Slovenia, and Spain) is comprised of severely affected countries. This impacted the countries' relative position and the creation of cross-country inequality, accordingly. Ireland is a special case, which could be assigned to the first group, but indicators do not always favour such a decision. The second group is characterised by the fact that the cycle and the crisis did not show a severe impact. However, it may be inferred that the Eurozone's cross-country inequality was primarily induced by changes within the first group.

This research confirmed that cross-country inequalities concerning profit incomes, recognition of labour used, differences in efficiency levels, and labour force exploitation, had been increasing before the crisis. During the crisis and under its influence, the cross-country inequalities decreased. The opposite dynamics occurred regarding cross-country inequality in the market position (distinct utilisation of market price disequilibria) and labour income. Here, the expansion involved decreasing inequality trends, whereas the crisis involved a diametrically opposite pattern. The paramount alterations affecting cross-country inequality took place in the countries exposed to higher pre-crisis inequality. Generally, the crisis had a greater influence on these countries compared to the Eurozone on average.

It becomes, therefore, evident that the phenomenon of cyclical influence on cross-country inequality has an adverse impact on Eurozone's prosperity. Uncoordinated cycles driven by unequal exchange, as well as asymmetric shocks, resulted in cross-country inequality exposing tension between national and supranational interests. This made the implementation of optimal policies notoriously difficult. Sub-optimal practice is further enhanced by limited policy instruments at the disposal of national governments, which, given the lack of harmonious policies, have acted to protect conflicting national interests. The cumulative effect is seen in the detrimental process of internal devaluation and in the recent invoking of the "exit" clause that has led to the obvious need for change, formally recognised in the Commission's 2017 White Paper. Consequently, in order to avoid the disintegration bias, policy makers must abandon the practice that has turned Eurozone trade into a zero-sum game, rather than a source of integrational wellbeing.

This study's principal contribution is the revival of the topic that should set the groundwork for questions remaining beyond this paper. Forthcoming research must examine the role of the Eurozone's structural heterogeneity, account for qualitative growth regimes, and encompass the importance of cross-country difference in the amount of abstract labour within labour power as a commodity. The necessity of addressing these issues is a consequence of destructive forces, which, if left intact, will result in system collapse. Failure to remedy the Eurozone's built-in destabilisers will not only foster extreme capital accumulation, but also "brain" centralisation induced by the outflux of skilled movers to the core, leaving the periphery sans social fabric and opening the door to new age economic imperialism. Thus, the redefinition of existing policies and the initiation of inclusive policies, reinforcing cross-country cohesion, become a prerequisite for protecting the ideals of equality and solidarity that united Eurozone countries in the first place.

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