

The impossible trinity of developing countries – the Greek example*

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Abstract

The mobility of factors of production from the very beginnings of the theory of the optimal currency area (OCA) stands out as one of the primary mechanisms for achieving a balance of payments, i.e. sustainability of the monetary union (Mundell criterion). However, there is a significant qualitative difference between the monetary union of countries with similar income levels and the one with different development stages. Namely, in the first case, labor mobility, as a rule, has short-term economic effects, while it has a longer-term (more negative) impact – especially on the long-run aggregate supply (LRAS). Many Eastern European countries, which expressed a desire to become part of European integration and the monetary union after the communist ruin, experienced this. In a previous paper, the authors set the thesis about “Impossible Trinity of Developing Countries”. In this paper, the aspiration is to confirm the validity of this theory by analyzing Greece within the period 1999-2020, specifically observing the impact of three variables (fiscal policy, social development level, and level of economic

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freedom) on the emigration of the population under conditions of monetary union and labor force mobility. The results obtained in this research indicate that the fiscal policy in the observed period was the most significant factor in explaining migration trends. The implications for developing countries that are currently entering (such as Croatia) or intend to enter the monetary union with more developed countries in the future are particularly significant.

Keywords: *impossible trinity, optimal currency area, migration, developing countries*

JEL classification: *F45, O15, O1*

1. Introduction

This paper is based on the experience that the best and globally most represented textbooks in International Economics, although extremely useful for students from developed countries, are unfortunately insufficiently adapted to the needs of students in developing countries. In particular, most of these textbooks have the standard textbook structure of the four domains studied within the International Economy: the theory of international trade – trade policy – a balance of payments and foreign exchange markets – the macroeconomics of the open economy. Within the latest part (macroeconomics of open economy, which we also call international finance), the standard content of the material is used to teach students how the price and income mechanisms of achieving external (balance of payments) balance work. Then they learn about the principles of compiling the IS-LM-BP (Mundell–Fleming) model. Finally, they apply the IS-LM-BP model to understand ways of achieving general equilibrium using monetary and fiscal policy instruments in different exchange rate regimes. Undoubtedly, this is extremely useful for students. However, it ignores the fact that the primary mechanism for achieving external equilibrium in DCs is often neither the price mechanism, the exchange rate policy, nor the income mechanism but the mobility of factors of production – particularly labor mobility (emigration). Besides, standard textbooks even mislead students of economics in DCs that after graduating, they will be ready to understand the reality, i.e. to understand the economic reality surrounding them. Unfortunately, this is not the case. Therefore, to adapt the material to the needs of students from DCs (particularly students from the Western Balkans⁵) we had to complete some standard theories from the international economy with lessons that explain the economic laws in these countries. Thus, in one of the previous papers (Đogo, 2022), we pointed out the existence of the *Chang curve* which contradicts

⁵ The term Western Balkans has been used by the European Union to designate countries in the Balkans that are not its members yet but are in different stages of accession. The first Western Balkans Summit was held in 2000 in Zagreb. The Western Balkans included Slovenia, Croatia, Bosnia and Herzegovina, Serbia and Montenegro, Macedonia, Albania, Romania and Bulgaria in the early 2000s. In the meantime, Slovenia (2004), Romania (2007), Bulgaria (2007) and Croatia (2013) have become EU members.

the common opinion that reducing the income gap between developing (from which citizens emigrate) and developed countries (to which developing countries citizens immigrate) automatically leads a reduction in the extent of emigration. Nevertheless, this paper deals with another standard textbook theory - *the theory of the impossible trinity*. In particular, all modern textbooks of International Economics usually cite the first version of the impossible trinity theory, presented by Mundell (1963) at the latest in 1963. The theory defines the impossibility of simultaneously conducting an independent monetary policy, exercising a fixed exchange rate, and allowing the free movement of capital. According to Boughton (2003), the concept was developed independently by Fleming and Mundell in different articles between 1960 and 1963. It should be noted that many economists, such as deem the *classical* theory of the impossible trinity as the most important achievement in international economics in general (Klein and Shambaugh, 2015). Less often, and mostly sporadically, textbooks mention the *new* or *alternative* impossible trinity, formalized in Beck and Prinz (2012), which states the impossibility of monetary unions to survive autonomous fiscal policies without a mechanism for recycling surpluses.

However, there was no explicit explanation of the trilemma developing countries currently face in any of the textbooks on the *International Economy* we came across. The trilemma represents the impossibility for developing countries to simultaneously be in a monetary union with developed countries while pursuing independent fiscal policy and the possibility of successful prevention of emigration. Hence, developing countries that adopt any monetary policy framework implying a fixed exchange rate, i.e. passive monetary policy (i.e. enter a monetary union, accept a currency board, official euroization, or even a classic fixed exchange rate regime), face the dilemma of either pursuing an expansive fiscal policy (thus keeping citizens in the country) or allowing mass emigration of the population. The only thing that would ease this trade-off is the possible generous inflow of foreign investment into the country. However, if there are no such inflows (or they are relatively low based on the percentage of Gross domestic product – GDP) and if the country faces fiscal constraints, the authorities face the dilemma of either allowing the departure of the workforce with implications for long-run aggregate supply (LRAS)⁶ or deciding to exit the monetary union. Structural reforms, which would prevent such a scenario, generally require more time to implement. In short, this is the experience of the *impossible trinity of developing countries*. However, such an experience has not yet been scientifically backed, which is why it would be justified to claim that the existence of the Impossible Trinity of DCs at this time is merely a hypothesis. Before we start proving the existence of this new impossible trinity,

⁶ The quiet observation of the permanent departure of labor leading to a shift to the left of the LRAS (reduction of the natural production rate) can also be considered an Eastern European variant of economic hysteresis.

we want to express our opinion on why economists from developed countries do not pay more attention to labor mobility as a mechanism (shock absorber) for achieving the sustainability of the monetary union. Namely, as noted by Feldstein (2011), Salvatore (2016), Basso et al. (2019), this mechanism works very poorly within The Economic and Monetary Union (EMU), Economic and Monetary Union (or at least among its most developed members). In other words, the population of the *old* European Union (EU) members is relatively static, which is at least partly related to language differences and the existence of nationalism. Encouraging migration within developed countries (for example, encouraging the French to leave France and move to Germany to reduce the French trade deficit) would have a negative political connotation, which is why few European economists decide to put this topic at the centre of their research. On the other hand, there is no need to raise this issue in the United States whatsoever. The population in the United States is very mobile and has no problem leaving one American state and moving to another to pursue a better job (Francisco and Giavazzi, 1993). Besides, there are significantly larger fiscal transfers in the United States⁷ which is why the United States as a monetary union operates with far fewer problems than EMU (Feldstein, 2015). Hence, economists from the United States have no need, and economists from the old EU members have no desire to explore this economic area. The only ones left are economists from developing countries who have the necessity and desire to deal with this topic.

With things like that, it is time to set our paper hypothesis. The hypothesis is:

Developing countries face a particular form of the impossible economic trinity. It implies the impossibility of simultaneously being in a monetary union with more developed countries, enabling complete freedom of labor movement, and conducting a restrictive fiscal policy, without these three leading to mass workforce emigration, which impacts the long-term development potentials of the country (embodied in LRAS).

The structure of our paper is as follows: after the introduction, in which we explain why we decided to do this research in the first place, we review the literature to find out whether and how many papers exist on the exact/similar topic. Following that is an explanation of the methodology and data sources used and given the presentation of the obtained results. In conclusion, we delivered a final opinion on whether the hypothesis was proven and presented our idea in which direction similar studies could move.

⁷ According to US Treasury (2023), federal spending of US Government in 2019 was equal to around 23% of the total gross domestic product (GDP) of USA. According to UK House of Commons (2021) EU spending in 2019 was equivalent to around 1% of national income across the EU's Member States.

2. Literature review

As already mentioned, we were the first to introduce the theory of the Impossible Trinity of developing countries in the paper (Đogo, 2022), and therefore, the literature on this new trilemma still does not exist. It also explains why this literature review is, unfortunately, modest. However, in this paper, we have pointed out that this new impossible trinity is closely related, more precisely that it arose from the integration of two Mundell theories (OCA and the impossible trinity theory) so that all the literature on these two Mundell theories (especially the theory of the impossible trinity) is actually relevant to this paper of ours. Regardless, we presented the literature related to the *classical* theory of the impossible trinity and the theory of OCA in our previous paper (and thus, forms a whole), so we will not present a comprehensive review of the literature concerning that field of research in this one. Only at the end of this literature review will we list some other sources we did not mention in the previous paper.

The basic premise of our work is that labor emigration has long-term negative macroeconomic consequences on the development of the country the workers leave. Yet, the opinion on this is not unanimous, which is why we give a brief overview of the literature dealing with this issue.

Hanson (2008) made a comprehensive review of the literature dealing with the economic consequences of labor migration from several aspects (microeconomic and macroeconomic) and both from the position of the countries the labor force leaves and the countries of their immigration. Thus, from this paper, we can notice that back in the mid-1970s, Bhagwati and Hamada (1974) pointed out that the problem for developing countries is that *the wrong individuals leave*, which harms the economic development of this group of countries. Even some recent studies, such as Chiquiar and Hanson (2005) and Docquier and Marfouk (2006), confirm that the more skilled a worker is, the more likely they are to emigrate to one of the more developed countries. Wong and Yip (1999) believe that the departure of the workforce has negative consequences for the long-term rate of economic growth, while Kerr et al. (2016) point out that the global movement of talent from developing to developed countries *tilts the deck even further*.

However, many more prominent economists regard emigration positively. At the same time, most of them linger for a short period in which emigration, according to the dominant opinion, has more positive than damaging effects, even in the countries from which workers leave.

The classic argument proving the existence of these positive (short-term) macroeconomic effects of emigration is the research that deals with remittances sent to developing countries by guest workers. Such works include Yang (2007), Acosta et al. (2007), and Acosta et al. (2008). Hanson (2010) believes that

emigration facilitates the macroeconomic adjustment of developing countries after having experienced some political or economic shock. Lucas (1988), Mountford (1997), Beine et al. (2001), Stark and Wang (2002) and Hanson (2010) consider that emigration can have net positive effects in the long run due to the increase in skills that emigrants acquire in developed countries and then transfer back to their home countries. Surveying as many as 127 countries in a 2006 repeat study, Beine et al. (2001) claimed to have found evidence of a widespread *benevolent brain drain* as a result of a *positive effect of skilled migration prospects on gross human capital formation*. Similar results came from Iranzo and Peri (2007), who also argued that migration benefits both the countries to which immigrants arrive and from which they leave. Mayr and Peri (2008) argue that temporary migration is widespread among migrants from Eastern European to Western European countries, including those who emigrate from Asia to the United States. This paper also claims that the *brain drain* causes *brain gain* since the perspective of migration encourages young people to go to school and use the acquired knowledge, if not in their own country, then at least in the country of immigration. Mishra in his study from 2007 examines empirically the effect of Mexican emigration to the United States on wages in Mexico using data from the Mexican and US censuses from 1970 to 2000. The main result of the paper is that emigration has a strong and positive effect on Mexican wages. There is also evidence of increasing wage inequality in Mexico due to emigration (Mishra, 2007).

A related group of papers are those arguing that emigration encourages entrepreneurship in developing countries and thus has a positive impact on the economic growth rate in the long run (Woodruff and Zenteno, 2007). A study by Docquier and Rapoport (2007) indicates the existence of the so-called *optimal migration rate*, which implies that deviation from this optimal rate, to higher but also lower, can have negative consequences for developing countries' growth.

As for the papers concerning the relationship between monetary, fiscal policy and emigration, our research, unfortunately, shows that it is almost impossible to find literature that deals with all three variables simultaneously.

In contrast, many works consider how entering the monetary union limits the fiscal policy autonomy, especially in the context of EU integration. Let us mention Galí and Monacelli (2005: 21) paper in which they prove that under the monetary union circumstances *the local fiscal authority is required to trade-off movements in inflation on the one hand with movements in the output and fiscal gap on the other*. According to Fatás and Mihov (2009), as a consequence of the Maastricht Treaty and the rules of the Stability and Growth Pact (SGP) there has been an increase in synchronization and coordination of fiscal policies within the EU even before the 2008 crisis. Galí and Perotti (2003), on the other hand, argue that the increase in synchronization and coordination of fiscal policies of EU member states has occurred as part of a broader trend in all developed countries to pursue

countercyclical fiscal policies. Hans-Werner (2018) claims that after the 2008 crisis, especially the debt crisis of the EU countries, the European Central Bank (ECB) entered the fiscal policy territory directly.

What can happen to small developing countries that enter into a monetary union with more developed countries and then try to compensate for the shortcomings of the common monetary policy dictated by larger countries through expansive fiscal policies is indicated by Leeper (2013: 2), who, among other things, states: *Outright default entails reneging on some portion of outstanding debt obligations and is the only type of default available to countries who do not control their own currency or who issue debt denominated in foreign currency. Members of the EMU fall into this category, as the ECB supervises their monetary policy dominated by countries not now experiencing sovereign debt problems. A higher probability of outright default reduces the value of outstanding government bonds and raises sovereign risk premia.*

Razin and Rosefield (2012: 125), who indicated the similarities between EMU and the gold standard, have claimed that: *The European Community members have put themselves in a monetary cage, akin to the gold standard, in which member states have surrendered control over their monetary and foreign exchange rate policies to the German dominated European Central Bank, without supplementary central fiscal, private banking and political union institutions.*

Bordo and James (2014: 4) have a similar opinion, deeming that the gold standard was less dangerous for member states than joining the EMU because *the gold standard was a contingent rule—in the case of an emergency like a major war or a serious financial crisis a country could temporarily devalue its currency. The EMU has no such safety value.*

Nevertheless, after the establishment of the European Stability Mechanism (ESM) and European Financial Stabilisation Mechanism (EFSF) programs, the situation has changed somewhat – EMU member states that encounter fiscal problems can count on some transfers from the EU level, as suggested by Gourinchas et al. (2020). However, these transfers are not automatic or unconditional, which is evident in the example of Greece. According to the findings of Gourinchas et al. (2020), Greece got the most transfers, i.e. as much as 43.7 percent of its output.

It is essential for our paper to mention the growing workforce mobility within the EMU. It was fueled by the debt crisis of some of its members, which began in 2010, as Aizenman (2015) and Jauer et al. (2014) point out.

However, as we have already mentioned, none mentions labor emigration. In fact, perhaps the only work we have encountered that at least partially takes into account all three of these variables fiscal policy, monetary policy (the existence of a monetary union), and emigration is that of House and Carpenter (2015).

Although this paper emphasizes fiscal policy, the authors rightly note that failure to incorporate the impact of capital and labor mobility results in a significant overestimate of future revenue. However, as we have already mentioned, none mentions labor emigration.

When it comes to works dealing with *false* impossible trinities, these papers have very little or nothing in common with the central issue (the relationship between the monetary policy of capital flows and the exchange rate regime) that Mundell and Fleming considered. Rodrik (2000) presented the thesis on the existence of a *political-economic trilemma*. According to him, the authorities can choose only two from three goals – democracy, national sovereignty, or globalization. Kaminsky et al. (2003) present three conditions (circumstances) that almost certainly cause the outbreak of the financial crisis in the country. Chari et al. (2021) points out that banks in India have used loosening of regulatory standards on capital adequacy in an attempt to curb the consequences of the expansion of Covid-19, to indicate the quality of bank placements better than it is, which has led to directing loans to worse clients (companies). Finally, there are works, like ours, which rely on the classic impossible trinity, adapting it to specific circumstances.

We want to add the following sources when considering additional sources that refer to the *classical* impossible trinity that we did not mention earlier.

In 1997, the term *trilemma* was brought to disseminated use within economics (Obstfeld and Taylor, 1998). Obstfeld and Rogoff (2002) argue that in an economy with integrated international financial markets, monetary policymakers can control their monetary instruments to achieve their target (Obstfeld and Taylor, 1998) Obstfeld et al. (2005) developed the first methods to enable empirical validation of this hypothesis in international macroeconomics.

Historically, in advanced economies, the years before 1914 and the 1970-2014 period were characterized by stable foreign exchange rates and free capital movement – whereas monetary autonomy was limited. The 1914- 1924 and 1950-1969 periods of restrictions on capital movement and capital controls led to prevailing exchange rate stability and monetary policy autonomy. (Eichengreen and Esteves, 2021).

3. Methodology

It is not easy to scientifically prove the existence of an impossible trinity of DCs, even though it is apparent to the authorities and many economists in developing countries. Namely, there are two basic ways to get it confirmed. One is to present indisputable logical proof of its existence. The other is to prove its existence through empirical research.

As for the first method, it should be remembered that the Mundell-Fleming impossible trinity was initially verified thanks to the emergence of the Mundell-Fleming (or IS-LM-BP) model (Zdunić, 2011). It could be stated that it was a kind of deduction application, more precisely an axiomatic method. Mundell and Fleming first deduced the existence of the IS, the LM and the BP curve (which became axioms). They then studied the presence of an impossible trinity by analysing a model based on these curves. It was only after that that numerous researches followed and only empirically confirmed what had already been theoretically proven. However, emigration is not a variable predicted in the Mundell-Fleming model, so this classical model cannot be used to confirm the presence of the Impossible Trinity of developing countries.

Empirical validation of the existence of the impossible trinity in DCs will not be easy either. Theoretically, it would be easiest to use the approach of Aizenman et al. (2008), i.e. modify their *trilemma index* to apply it to the new trinity. However, the problem arises when choosing the right example for conducting the analysis. We recall Dostoevsky's words: *Happy families are all alike; every unhappy family is unhappy in its own way*. It is also the issue with countries facing a choice between emigration, monetary union and expansionary fiscal policy, where it is difficult to find a *clean* case. In particular, due to excessively unfavourable circumstances (war, riots) some developing countries have gone through the experience of mass emigration in the early stages of transition. Therefore, the workforce *reservoir* has been significantly emptied, so it will not be easy to prove that later admission into the monetary union with developed countries generated a new wave of emigration.

In the case of those developing countries that have adopted a monetary policy framework that implies particular exchange rate regime flexibility (such as Serbia, Macedonia and Croatia), proving the existence of this new impossible trinity is even more challenging. Namely, these countries should be able to limit emigration and pursue an expansive fiscal policy, all thanks to the fact that they can use the exchange rate policy and monetary policy to fix their imbalances. However, there are almost no developing countries that have adopted a free-floating exchange rate regime, and in nearly all countries, the authorities are trying to keep the exchange rate stable against the currency of the primary trading partner. The third limiting factor for conducting our analysis is that, in many cases (DCs), the very possibility of pursuing an expansive fiscal policy is debatable. Hence this opportunity depends on the already reached level of public debt and political circumstances (acceptability of further growth of public debt), so it can often be perceived as an exogenously given factor.

Nevertheless, after lengthy deliberations and several attempts to find a proper model for empirical research, we decided to try to prove the existence of the impossible trinity of developing countries using the example of Greece.

For the econometric analysis, based on results of unit-root test, we applied Vector Error Correction Model (VECM). The VECM is commonly used to model the stationary relationships between multiple time series that contain unit roots and implements Johansen’s approach for estimating the parameters (Stata Corporation, 2017). If the variables are order one integrated I(1) and are cointegrated i.e. the long-run equilibrium relationship between them exists, then the interdependence can be presented as the error correction model. The VECM can directly estimate the level to which a variable can be brought back to equilibrium condition after a shock on other variables. It is very useful by which to estimate the short-term effect for both variables and the long run effect of the time series data.

The general form of a VECM (p) where p is the lag of endogenous variables with cointegration rank $r \leq k$ where k is number of endogenous variables, is as follows (Usman et al. 2017; Zou, 2018; Ivanova et. al, 2021):

$$\Delta y_t = \alpha \beta' y_{t-1} + \sum_{i=1}^{p-1} \Theta_i \Delta y_{t-i} + \delta_t + D_t + \varepsilon_t \quad (1)$$

where Δy_t is a vector of the first difference of endogenous variables; α is a vector adjustment matrix with order $(k \times r)$; β' is a vector cointegration matrix $(k \times r)$; Δy_{t-1} is a vector variable endogenous with lag 1; Θ_i is a vector of the short-run coefficients; Δy_{t-i} is a vector variable endogenous with lag i ; δ is a $k \times 1$ vector of trend coefficients; D_t is a $k \times 1$ vector constant, ε_t ; $k \times 1$ vector residuals.

As stated above, α is vector adjustment matrix and shows the speed of error correction mechanism. A larger α imply a faster convergence toward long-run equilibrium in cases of short-run deviations from this equilibrium. The $\beta' y_{t-1}$, usually denoted as ect_{t-1} , is the error correction term which reflects long-term equilibrium relationships between variables.

4. Empirical data

Using the World Economic Forum terminology, as a country with a GDP of \$ 17,647.2 per capita in 2020 (World Bank, 2022), Greece is on the verge of belonging to a group of countries whose development is based on increasing productivity (industrialized economies, countries with upper-middle income) or a group of countries (Schwab, 2014) whose development is based on innovation (post-industry economies, high-income countries)⁸. In addition, Greece has been a

⁸ According to the development level, all countries fall into three categories in the Global Competitiveness Report 2014/15: Phase 1 - countries whose development is based on resources, Phase 2 - countries whose development is based on increasing productivity and Phase 3 - countries whose development is innovation-based. You enter the third group of countries after your GDP per capita exceeds \$ 17,000.

member of the EMU for 20 years, and after 2010 it experienced the implementation of a restrictive fiscal policy. Considering that the motive of this paper is to warn the Croatian public about the risks of entering a monetary union with more developed economies and that Greece's GDP per capita is only 25% higher than Croatia's GDP per capita, this example seemed adequate. This warning of ours is not something entirely new. The well-known Croatian economist Zdunić (2011) pointed to the connection between the impossible trinity, fiscal policy and possible recession in countries in transition, including Croatia.

After selecting an example for empirical research, we could apply analysis to prove the existence of the impossible trinity of developing countries. In doing so, the chosen example proved once again convenient because, thanks to Greek membership in EMU since 2001, research into the relationship between three variables (trinity) has practically been reduced to research into the relationship between two variables (duality). More specifically, this allowed us to focus on confirming the existence of a negative link between fiscal policy and emigration and quantifying that link.

However, as in any research, several practical issues/problems arose. The first was how to measure the autonomy of the fiscal policy of the observed country. Should one consider public revenues (changes in the tax burden) or public spending (or only some of its components)? Should we only regard indicators for one country or, as autonomy usually implies, take into account the correlation in the movement of fiscal policy of two or more countries?

Our choice was to measure the expansiveness of fiscal policy through indicators of the movement of the salary fund of employees in the public sector (Sector: General Government – Compensation of employees). This indicator best reflects the austerity policies the Western Balkan countries had to implement after the 2008 crisis. The total public spending, especially measured as a percentage of GDP, would blur the notion. This *blurring* would be a consequence before the fall in the GDP of these countries, making it impossible to notice how much the reduction in public spending has occurred. Also, the focus of fiscal consolidation in these countries in the 2012-2016 period on limiting or even reducing wages in the public sector has convinced us that of all the components of public spending, this one best reflects the purpose of this research. Data on this indicator (General Government – Compensation of employees) are from the IMF (International Monetary Fund, 2022).

Also, aware that in modern times the value of money changes significantly even in shorter intervals and that our analysis is based on research on the movement of observed variables in the twenty-year period, we opted to analyse the salary fund of employees in the public sector both in current (current €) and in stable values (€ 1999). We achieved this by correcting the value of the public sector salary bill, the Money Purchasing Power Index. For building this index, we used data on the

inflation rate in Greece (measured as CPI), and we found this data on the World Bank's website (2022).

Having applied the Eurostat (2022) website, we attempted to find data on the second variable (emigration from Greece). To our surprise, these data for Greece date back only to 2009, which was not enough for the needs of our research, i.e. we would not be able to conduct a reliable regression analysis with such a short data series. That is why we turned to an alternative source of data – the Federal Statistical Office of Germany. German Federal Statistical Office – Statistisches Bundesamt, (2022). Namely, this German state body is known for its thorough and transparent work, so it is possible to find data on the number of foreigners who visit this country yearly for various reasons in their publicly available databases.

Although emigration from Greece is not equal to mere emigration to Germany, the largest European economy is naturally the most alluring bait for the workforce from the rest of the continent (including Greece). Therefore, it seems reasonable to assume that the data of this German state institution can be helpful in our finding a fairly reliable substitute for the data we wanted to obtain from Eurostat. Of course, when interpreting the obtained results, we always have to consider their meaning regarding the data sources used.

However, we have encountered another problem here. Namely, as Delors plan for the establishment of an economic and monetary union provided for the abolition of all restrictions on the movement of the workforce in EU member states⁹, it is not simple to extract data from the total number of Greeks who visit Germany annually which would refer only to those going there to work. In particular, the Federal Statistical Office of Germany, which provides data on as many as 13 grounds for obtaining a residence permit in Germany, in the case of Greek citizens, uses only one basis for obtaining a residence permit – Right of resid. acc. to EU Law on Freedom of Movement (European Commission, 2022). Therefore, in our analysis, we had to accept the data for which we have a reliable source (on the number of Greek citizens who visit Germany every year) as a substitute for data on the number of Greek citizens who come to Germany with the intention of working there.

To avoid the problem of one independent – one dependent variable, in addition to two independent variables, we introduced two control variables (Economic Freedom and Human development) into the analysis. The reason for choosing these two variables is that, through a review of the relevant literature, we noticed that the most frequently mentioned factors that influence migration movements are economic factors, political factors (level of freedom), and sociological factors (level of social development).

⁹ It is because Directive 2004/38 and the Treaty on the Functioning of the European Union from 2012 pledge complete freedom of movement for citizenship of any EU member state within all other countries.

The data for the estimation is available for the period 1999-2020 on an annual basis. It is a relatively small number of observations for time series analysis, but on a semi-annual or quarterly level, the data are not available. We tried to use two different control variables, which, according to previous research and our assumptions, could impact immigration, such as the level of human development and economic freedom and life expectancy. The description and specification of all variables used in natural logarithms (Table 1).

Table 1: Specification of research variables

Variable	Type	Label	Source
Immigration from Greece (number of people)	Dependent	Immig	German Federal Statistical Office – Statistisches Bundesamt (2022)
Government Compensation of employees adjusted for the Purchasing Power Index (in EUR)	Independent	comp_ppp	International monetary Fund (2022)
Government Compensation of employees (in EUR)	Independent	Comp	World Bank (2022)
Economic freedom, index	Control	Freed	The Heritage Foundation (2022)
Human development	Control	Hdi	World bank, World Development Indicators

Source: Author's research

To choose the appropriate econometric model for testing the existence of the relationship between immigration from Greece and government compensation, we started by detecting the order of integration variables used in the model. For this purpose, we used three different unit-root tests: Augmented Dickey-Fuller, Phillips-Perron, and Zivot-Andrews. The last one allows for a single break in intercept and/or in a trend. The last one is important because conventional-unit root tests, such as Dickey-Fuller and Phillips-Perron, are not completely reliable if the time series contains a structural brake. So, taking into account that the last 15 years were characterized by crises and also prosperity (before 2008), we also tested the series for the structural break using the supremum Wald test.

According to the ADF and Phillips-Perron unit root test, all variables contain a unit root at level. The index of economic freedom became stationary at 5% of significance after first differencing but other variables did not. Results of Zivot-Andrews unit-root test confirmed non-stationarity of the time series at the level, but also confirmed the stationary of all variables at their first difference, except

immigration, which required two differentiations to become stationary. As the supremum Wald test proves the existence of the structural brake all time-series contains a structural brake, the Zivot-Andrews was taken as authoritative for the conclusion regarding the order of integration of our variable. All variables are integrated of order I (1), while the dependent variable, immigration, are integrated of order I (2).

Results of unit-root root testing are presented as well as estimated break date-root test (Table 2.).

Table 2: Unit-root test

Variable (in log)	Unit-root at	ADF (Z(t))	Phillips- Perron (Z(t))	Zivot- Andrews (t-stat)	Break date
immig	Level	-0.589	-0.793	-3.981	2010
	First difference	-2.793	-2.754	-3.780	
	Second difference	-5.567	-5.735	-8.771	
comp_ppp	Level	-1.712	-1.745	-3.004	2010
	First difference	-3.001	-2.789	-7.703	
comp	Level	-1.542	-1.531	-2.768	2010
	First difference	-2.724	-2.760	-7.735	
freed	Level	-1.922	-2.103	-3.166	2012
	First difference	-3.662	-3.627	-5.278	
hdi	Level	-2.474	-2.583	-4.538	2007
	First difference	-3.391	-3.313	-6.026	

Notes: 5% Critical value for: ADF and Phillip-Perron unit root test is 3.6; for Zivot-Andrews test is 5.08.

Source: Author's calculation

The order of integration of our variables determined the appropriate model for determination appropriate model for the further analysis. Since all our variables are integrated of order (1) except one, which is integrated of order (2), we decided to use Johansen cointegration test and Vector Error Correction Model – VECM. These techniques require that all of variables are integrated of order one what we archiver by using the immigration variables at the first difference.

The Johansen procedure allows to analyze whether two- or more-time series can form a co-integrating relationship – i.e., if they have a long-run equilibrium relationship. VECM is an error correction model that is embedded into Vector autoregressive (VAR) framework so that the short- and long-run relationships

between a set of variables can be modeled simultaneously. If the Johansen procedure confirms that there is the existence of the long-run relationship between variables, VECM can be applied. So VECMs are used to model the stationary relationships between multiple time series that contain unit roots, and it implements Johansen procedure for estimating the parameters of a VECM (Brooks, 2014; Asteriou and Hall, 2016; Stata Corporation, 2017)

Before the determination of the cointegration and the estimation of long- and short-run relationships among observed variables, descriptive statistics are shown (Table 3). In the econometric analysis, natural logarithms are used but in the descriptive statistic, variables are expressed in original values for information reasons.

Table 3: Descriptive statistic

Variable	Obs	Mean	Std. Dev.	Min	Max
Immigration (number of persons)	21	327,461	33,012	276,659	365,438
Government compensation of employees (in EUR, adjusted for PPP)	21	16,265	2,475	13,445	22,061
Government compensation of employee (in EUR, adjusted for PPP)	21	21,598	4,275	13,445	30,425
Index of Economic Freedom	21	58.58	2.94	53.20	63.40
Human development index	21	0.86	0.03	0.80	0.89

Source: Author's calculation

Descriptive statistics provide simple summaries of the sample and of the observations that have been made. There is no objective standard for small and large standard deviations. We can only judge whether the average deviation is small or large depending on the context and the particular thing we are trying to measure. Generally, more than two standard deviations above or below the mean are considered high. In that case, 95.5% of data will be present within two standard deviations of a normal distribution. In this case data on the number of migrants in the observed period vary from 276,659 to 365,438 with a standard deviation of 33,012. According to this data, it is obvious that the standard deviation of migration is high, which means that the numbers have changed significantly from year to year. However, the standard deviation data for Government compensation of employees (in EUR, adjusted for PPP) and Government compensation of employees (in EUR, adjusted for PPP) vary even more but do not exceed two standard deviations. On the other side, there are no big variations in the Index of Economic Freedom and Human Development Index.

Since we have a very short time series (21 years, for the period 1999-2019), In the Johansen procedures, we use our variables of interest immigration and amount

of government compensation of employees (in current EUR and adjusted for PPP) and one of the proposed control variables. It is not possible and reasonable to use a lot of variables in very short time series. The model which only showed the existence of cointegration was one that included the following variables (prefix “I” denotes indicates that the variable is used in the logarithm): immigration (limmig), government compensation of employee adjusted for PPP (lcomp_ppp) and Index of Economic freedom (lfreed). Doe to the fact that Johansen procedure and VECM require the use of variables integrated in the order I (1), we used immigration as their first difference. The number of lags used in the estimation is three.

Results of the Johansen cointegration in immigration, compensation of employees, and economic freedom are presented in Table 4. Because the trace statistic at $r = 0$ of 36.8468 exceeds its critical value of 29.68, we rejected the null hypothesis of no cointegrating equations and accepted the alternative saying that there is cointegration in the system. Since the trace statistic at $r = 2$ of 14.7527 is less than its critical value of 15.41, we cannot reject the null hypothesis that there is one cointegrating. So we accepted $r = 1$ as our estimate of the number of cointegrating equations between these three variables and concluded that a long-term relationship between the analyzed variables exists.

Table 4: Johansen cointegration in immigration, compensation of employee and economic freedom

Number of obs:	17	Lags	3	Sample:	2003-2019
Maximum rank (r)	Params	LL	Eigenvalue	Trace statistic	5% Critical value
0	21	105.8999	.	36.8468	29.68
1	26	116.9469	0.72737	14.7527*	15.41
2	29	122.2344	0.46316	4.1776	3.76
3	30	124.3233	0.21788		

Source: Author’s calculations

If a set of variables is found to have one or more cointegrating vectors, then VECM is appropriate as the estimation technique, which adjusts to both short-run changes in variables and deviations from long-run equilibrium.

In table 5 the VECM estimates for immigration, compensation of employee and economic freedom is presented, and, as we expected, confirms the existence of a long-run relationship between immigration, government compensation and economic freedom in Greece for the period 1999-2019. Our equation of interest is the first equation, where immigration is a dependent variable.

Table 5: VECM estimates for immigration, compensation of employee and economic freedom

VARIABLES	(1)	(2)	(3)
	D_dlimmig	D_lcomp_ppp	D_lfreed
L_ce1	-0.993*** (0.284)	0.471 (0.852)	-0.185 (0.267)
LD.dlimmig	-0.171 (0.263)	-0.139 (0.789)	0.268 (0.248)
L2D.dlimmig	-0.191 (0.241)	-0.0751 (0.723)	0.0696 (0.227)
LD.lcomp_ppp	-0.431*** (0.148)	0.452 (0.442)	0.290** (0.139)
L2D.lcomp_ppp	-0.343** (0.149)	0.279 (0.446)	0.270* (0.140)
LD.lfreed	0.174 (0.233)	0.0906 (0.699)	-0.164 (0.219)
L2D.lfreed	0.745*** (0.192)	-1.062* (0.576)	-0.436** (0.181)
_trend	-0.00167 (0.00186)	-0.00177 (0.00558)	0.00448** (0.00175)
Constant	0.0129 (0.0194)	0.00905 (0.0581)	-0.0470*** (0.0182)
Observations	17	17	17

Source: Author's calculation

A crucial parameter in the estimation is the coefficient of the error correction term (ect $t-1$ denoted in the table 5 as L_ce1), which measures the speed of adjustment of immigration to its equilibrium level. This parameter is statistically significant at 1% of significance and negative. The value of the error correction term is -0.993 which means that 99.3 % of the deviation from long run equilibrium are corrected within on year.

The second part of Table 5 reveals information about whether the past values of variables affect the current values of the variables (short-run coefficients). If we look at the short-run coefficient, it can be concluded that our variable of interest, government compensation of employees has a statistically significant and negative impact on immigration at the first and second lags. The signs are negative which means that an increase in government compensation will decrease immigration from Greece in the next two years. The index of economic freedom is also significant and has the opposite direction compared to government compensation. An increase in economic freedom increases immigration from Greece in for two years.

We also tested if we correctly specified the number of cointegrating equations. The results of the stability conditions are presented in Table 6 and Figure 1.

Table 6: Stability test for the cointegration relationship

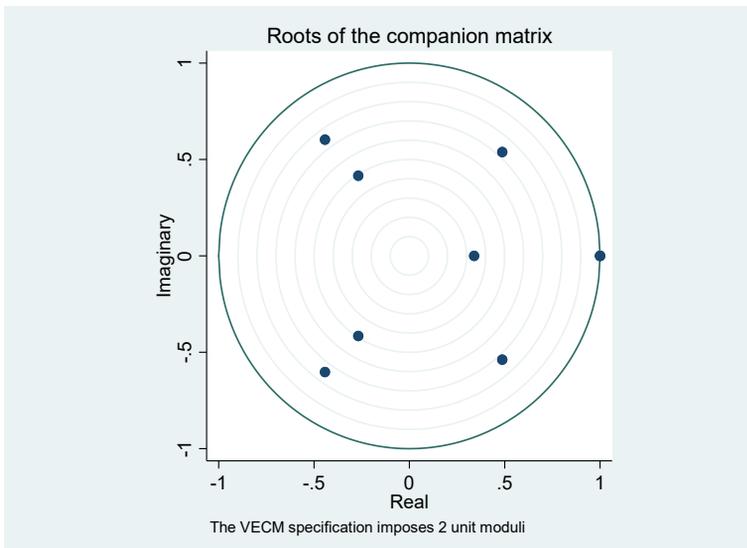
Eigenvalue	Modulus
1	1
1	1
$-.4426788 + .6026721i$	0.747782
$-.4426788 - .6026721i$	0.747782
$.4870174 + .5384714i$	0.726042
$.4870174 - .5384714i$	0.726042
$-.2679291 + .4156049i$	0.494483
$-.2679291 - .4156049i$	0.494483
0.3395482	0.339548

Notes: The VECM specification imposes 2 unit moduli

Source: Authors' calculation

If the process is stable, the moduli of the remaining eigenvalues are strictly less than one. Since there is no general distribution theory for the moduli of the eigenvalues, detecting whether the moduli are too close to one is difficult. But in our results, all eigenvalues are strictly less than one, thus confirming the stability of our model.

Figure 1: Stability test for the cointegration relationship



Source: Author's research

Figure 1 shows that none of the remaining eigenvalues (except the first two) appear close to the unit circle, which means that the stability check does not indicate that our model is misspecified.

5. Results and discussion

The results of a regression confirm our hypothesis that the restrictive fiscal policy of Greece has led to a significant increase in the emigration of their population toward Germany. The analysis results provide confirmation of the initial research hypotheses of the study. The final phase of analysis proves the existence of a significant inverse relationship between the government compensation of Greece and their population's emigration toward Germany. Namely, with a 95% confidence interval, the expansiveness of Greek fiscal policy can justify that as much as 76% of the labor force emigrates from Greece to Germany.. It is not only the period from 2011 up to the present but also the earlier period. By carefully analyzing the data it is noticeable that while the Greek government pursued an expansive fiscal policy (1999-2010), Greece permanently recorded a trend of declining emigration towards Germany. When the Greek government, pressured by the burden of public debt, had to change its fiscal policy from an expansive to restrictive one in 2011, this led to a renewed increase in the number of Greeks emigrating to Germany.

Those findings are quite significant. Earlier, the concept of an optimal currency area did not take into account the long-run costs of emigration of the labor force. Considering that *optimality* means that benefits prevail over costs, introducing this new kind of cost could change the result in the same cases. This means that the basic theory of the optimal currency area is upgraded by the developing country's experience. We believe that, after this work, every researcher in the field of optimal currency area should pay attention to those findings.

Apart from academics, those are also significant findings at the political level. This indicates that big and developed countries, seeking leadership positions, should have more understanding of the more expansive fiscal policy of less developed countries that participate in economic integrations with them. This would be ethical because we proved that the cost of participating in a monetary union with more developed countries means that costs of restrictive fiscal policy are much higher in developing countries compared to costs in developed countries.

6. Conclusion

Contemporary economic theory is full of *triangles*, i.e. trilemmas, some of which are unquestionable while others are yet to prove their validity. One of these new

trilemmas, which is to be confirmed, is the *Impossible Trinity of developing countries*, presented in this paper. The essence of this trinity is that in conditions when a developing country enters into a monetary union with a developed country (or binds its currency to the currency of that other country), the authorities of that country face a dilemma – to pursue an expansive fiscal policy or allow mass emigration of the labor force. The third option is to abandon the peg of the exchange rate, and in that case, there is a trilemma where the country can choose any two of the three considered positions.

We determine a significant regression interconnection between government compensation and migration in Greece. We believe that this paper has unequivocally confirmed the existence of this new impossible trinity. Of course, many questions remain open. First, there should be more research on this topic to substantiate the existence of the impossible trinity of developing countries on a much more extensive number of examples. Currently, only the example of Greece proves the existence of the impossible trinity of developing countries analyzed exclusively in the last 20 years or so.

We regret to note that most of the examples that are to appear in the future will probably be negative. They will discuss countries that, as a consequence of entering an economic and monetary union with significantly more developed countries, had to go through a period of significant labor emigration before achieving the new macroeconomic balance.

Moreover, if the major political blocs (like the EU and the USA) do well economically, which would suit us all, we will lack examples to prove the impossible trinity of developing countries. It is because, as a rule, in periods of prosperity, there is not so much pressure on the governments of developing countries to lead restrictive fiscal policies. Nevertheless, it still will not be proof of the non-existence of the impossible trinity of developing countries, but, unfortunately, it will only linger for a fresh opportunity.

Then, it is necessary to introduce this trinity into the analytical apparatus for the macroeconomic trends analysis, which has not been the case so far. We believe that whoever develops such an analytical apparatus would deserve great gratitude from students of economics, professional (macro) economists, and the governments of developing countries.

Also, there should be additional research on the impact of labor force emigration on the longterm rate of aggregate supply. We have noticed a considerable ideological influence in the papers we have encountered. The once indisputable fact that the departure of the labor force leaves the country without a part of available resources (which is why it harms LRAS) has been relativized in the last thirty years. Therefore, there is even talk of an increase in welfare due to the mass departure

of the workforce. The logic is based on pointing to the productivity increase of the labor force remaining in the country. However, theoretically and empirically, there are several ways to increase labor productivity, so starting from the premise that labor force emigration is the only possible way, in our opinion, is wrong.

So there is an expected fierce struggle ahead of researchers.

However, even just confirming the existence of the Impossible Trinity of developing countries is a significant alarm to the authorities of the countries wanting to enter a monetary union with developed countries. It warns them to reckon that in the catching-up period (economic development), they will be forced to pursue expansionary fiscal policy or to allow the workforce departure from the country with all the implications on the LRAS. Furthermore, further research should focus on exploring the interdependency of these data with the growth rate of the gross domestic product of CEE countries.

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Nemoguće trojstvo zemalja u razvoju – primjer Grčke

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Sažetak

Mobilnost faktora proizvodnje od samih početaka teorije optimalnog valutnog područja (OCA) izdvaja se kao jedan od primarnih mehanizama za postizanje ravnoteže platne bilance, odnosno održivosti monetarne unije (Mundell kriterijum). Međutim, postoji značajna kvalitativna razlika između situacija u kojima postoji monetarna unija zemalja sa sličnim dohodovnim razinama i kada postoji monetarna unija zemalja u različitim razvojnim fazama. Naime, u prvom slučaju mobilnost radne snage, po pravilu, ima kratkoročne ekonomske efekte, dok u drugom slučaju ima dugoročniji (negativniji) utjecaj – posebno na dugoročnu agregatnu ponudu (LRAS). To su doživjele mnoge istočnoeuropske zemlje, koje su nakon propasti komunizma izrazile želju da postanu dio evropskih integracija i monetarne unije. U prethodnom radu smo postavili tezu o postojanju “Nemogućeg trojstva zemalja u razvoju”. Ovaj rad nastoji potvrditi valjanost ove teorije. To smo učinili analizirajući događanja u Grčkoj u periodu (1999-2020). Konkretno, analizira se utjecaj triju varijabli (fiskalne politike, nivoa društvenog razvoja, razine ekonomskih sloboda) na emigraciju stanovništva u uvjetima monetarne unije i mobilnosti radne snage. Rezultati koje smo dobili pokazuju da je fiskalna politika u promatranom periodu bila najznačajniji čimbenik u objašnjenju migracijskih kretanja. Implikacije za zemlje u razvoju koje trenutno ulaze (poput Hrvatske) ili namjeravaju ući u monetarnu uniju s razvijenijim zemljama su značajne.

Ključne riječi: nemoguće trojstvo, optimalno valutno područje, migracije, zemlje u razvoju

JEL klasifikacija: F4, O15, O1

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