Mednarodno inovativno poslovanje
Journal of Innovative Business and Management

Gross capital flows as a superior metric in explaning capital flows and allocation in the EU: evidence from 1995-2018

Tajana Toš*

Abstract: Research on Lucas's paradox and the allocation puzzle has not reached a consensus on which type of capital should be used to study the magnitude and direction of capital flows. With limited exceptions, the analysis of Lucas's paradox and the allocation puzzle has predominantly relied on net capital flow variables, as opposed to gross capital inflows and outflows. The frequent inconsistencies in the conclusions of numerous studies may be attributed to variations in variable selection and the lack of precise definition of the chosen variables within the models. The primary objective of this study is to ascertain the appropriate capital flow measure for empirical research of these phenomena. The study was conducted on EU member states and it examined the stability and procyclicality of gross inflows and outflows, as well as net capital flows. The findings strongly suggest that gross capital flow categories should be employed in such analyses, and the conventional reliance on net capital flow variables should be abandoned.

Keywords: net capital flow, gross capital flow, Lucas paradox, allocation puzzle
JEL classification: F21

Bruto kapitalski tokovi kot boljše merilo za razlago kapitalskih tokov in alokacije kapitala v EU: ugotovitve za obdobje 1995-2018

Povzetek: Raziskave Lucasovega paradoksa in problema alokacije kapitala še niso dosegle soglasja glede tega, katero vrsto kapitala je treba uporabiti za proučevanje obsega in smeri kapitalskih tokov. Z nekaj izjemami se analiza Lucasovega paradoksa in problema alokacije večinoma opira na spremenljivke neto kapitalskih tokov, namesto na bruto kapitalske prilive in odlive. Pogoste nedoslednosti v zaključkih številnih študij je mogoče pripisati razlikam v izbiri spremenljivk in pomanjkanju natančne opredelitve uporabljenih spremenljivk v modelih. Glavni cilj te študije je ugotoviti, katero merilo kapitalskih tokov je najprimernejše za empirično raziskovanje teh pojavov. Študija je bila izvedena na državah članicah EU in je preučevala stabilnost in procikličnost bruto prilivov in odlivov ter neto kapitalskih tokov.
Ugotovitve močno nakazujejo, da bi bilo treba v takšnih analizah uporabljati kategorije bruto kapitalskih tokov, medtem ko bi bilo treba tradicionalno zanašanje na spremenljivke neto kapitalskih tokov opustiti.

Ključne besede: neto kapitalski tok, bruto kapitalski tok, Lucasov paradoks, problem alokacije

**PhD, Visoko učilište Effectus, Zagreb;
State electoral commission of the Republic of Croatia
tostajana@gmail.com*

DOI 10.32015/JIBM.2025.17.1.7

Mednarodno inovativno poslovanje = Journal of Innovative Business and Management

ISSN 1855-6175

1 INTRODUCTION

Net capital flow variables are derived from current account deficits or surpluses. The fact that the current account and capital flows are often used interchangeably highlights their deep-rooted presence in capital flow research. However, the tendency of poorer countries to maintain current account surpluses while wealthier countries often run deficits does not, in itself, provide insight into the extent to which a poorer country relies on external financing, nor does it clarify the direction of financial flows (Borio and Disyatat, 2016). With few exceptions, Lucas's paradox and the allocation puzzle have primarily been examined using net capital flow variables.

Recent empirical research has demonstrated that, particularly during and in the aftermath of financial crises, gross capital flows have altered their trajectory and contracted. However, similar conclusions cannot be reached solely through an analysis of net capital flows (Hobza and Zeugner, 2014; Passari and Rey, 2015).

The empirical literature on capital flows almost universally treats capital flow as a dependent variable. However, its definition of capital is highly variable, leading to significant discrepancies in measurement. These differences in definition, and consequently in measurement, are often the primary reason for the contradictory findings in numerous studies on what appears to be the same topic. Toš and Kvesić (2017) theoretically defined three potential model-related issues as assumptions for inconsistent research results: the sample of countries, the type of capital as a variable in the model, and the composition of capital inflows.

Several key differences can be identified as crucial factors influencing the final outcomes of research. Before the global financial crisis, capital flow research primarily focused on net capital flows and measured them through the current account. However, following the financial crisis and significant fluctuations in capital flows, the research focus shifted from net flows to gross capital flows. Since gross flows are not clearly reflected in the current account, the financial account replaced the current account of the balance of payments as the primary tool for measuring capital flows. According to the International Monetary Fund (IMF), the balance of payments is a document summarizing all economic transactions between a country's residents and non-residents over a specific period (BPM6 IMF, 2009, p. 7). It consists of the current account, the capital account, and the financial account. The revisions to the balance of payments reporting framework, implemented in 2012, introduced significant modifications to the financial account. Beyond a change in sign convention, the traditional classifications of credit and debt were redefined as net acquisition of financial assets and net incurrence of liabilities. Under this revised methodology, a positive value in net asset acquisition denotes an increase in financial assets, whereas a negative value indicates a decrease. Consequently, the net position of any category of capital flows (foreign direct investment, portfolio investment, or other financial instruments) is now derived by subtracting net liability incurrence from net asset acquisition, rather than by summing credit and debt as per the previous framework. This adjustment also alters the interpretation of the financial account balance: a negative sign now indicates a net inflow of capital, while a positive sign denotes a net outflow. Terminology in academic papers and research remains inconsistent, often lacking clear definitions, which can significantly alter the implications of research conclusions.

In academic literature, *net capital flows* are often referred to as net capital inflows and, within the balance of payments framework, they correspond to account balances. They represent the net amount derived from the difference between gross capital inflows and gross capital outflows. In studies that employ the term "net capital inflows," a positive value denotes an inflow of capital, whereas a negative value indicates an outflow. Before the financial crisis, this category was measured using the current account of the balance of payments.

Gross capital inflows are equivalent to the net incurrence of liabilities in the financial account of the balance of payments. Some studies also refer to this category as net capital inflows, but in such cases, they define the difference between gross inflows and gross outflows simply as net flows.

Gross capital outflows correspond to the net acquisition of financial assets within the financial account of the balance of payments. In certain cases, this category is referred to as net capital outflows.

Gross inflows and gross outflows can take both positive and negative values, as decreases in inflows or outflows within the financial account are recorded as negative positions.

Akhtaruzzaman (2019) highlights the inconsistency in defining foreign direct investment (FDI) across different studies, noting that few sources clearly specify the dependent variables used in their research. For example, Alfaro et al. (2008) provide a clear definition, whereas other studies use terms interchangeably. The terms "net FDI" and "net flows" are often used synonymously with "net FDI flows," which refer to the difference between gross inflows and gross outflows of FDI. Jensen (2003) uses the term "net FDI inflows" to refer to gross inflows, whereas Busse and Hefeker (2007) use the same term to describe net FDI, meaning the difference between gross inflows and outflows.
Furthermore, institutions such as the World Bank and UNCTAD define gross FDI inflows as "net FDI inflows" and net FDI as "net FDI flows." Because many studies fail to define their variables clearly, researchers often misinterpret previous works that use the same terminology but refer to different financial indicators.

Before the financial crisis, most research focused on net capital flows, which were measured through the current account of the balance of payments rather than the financial account and the difference between gross inflows and outflows. The belief that the current account—representing the gap between a country's savings and domestic investment—accurately reflected net capital flows was based on the observation that current account surpluses and deficits aligned with capital movements. However, just before the crisis, large discrepancies emerged, with developed economies running deficits and developing countries posting surpluses. These imbalances had to be financed through complex multilateral patterns of gross financial flows (Obstfeld, 2012, p. 3).
Borio and Disyatat (2016) argue that while savings and investments, as reflected in the current account, influence the natural interest rate, they do not determine the market interest rate. This raises the question of whether the smaller and more stable net capital flows truly provide an adequate measure of capital movement.

After the financial crisis, global current account imbalances were significantly reduced. Developing countries saw their current account deficits shrink in terms of net capital flows, whereas the surpluses of developed economies remained largely unchanged. Several scholars emphasize the importance of gross capital flows—Shin (2012), Obstfeld (2012), and Rey (2013) focus on gross inflows and outflows, while Forbes and Warnock (2012) identify periods of sudden surges, reversals, or stops in capital flows, attributing these fluctuations primarily to global factors. Calderon and Kubota (2013) conduct similar research on sudden stops in capital flows, again using gross inflows as a basis, while some studies also categorize flows by capital type (Albuquerque et al., 2004; Milesi-Ferretti and Tille, 2011).

Despite changes in research, current account imbalances—and consequently, net capital flows—remain deeply ingrained in economic analysis. Borio and Disyatat (2016) criticize the conventional focus on the current account, arguing that it does not provide clear insights into a country's international borrowing or lending. They highlight the limitations of the current account and contend that Lucas's paradox is not actually a paradox. Moreover, they assert that financial integration and the Feldstein-Horioka puzzle cannot be assessed based on the size of the current account (Borio and Disyatat, 2016). Their arguments for the importance of gross capital flows are supported by Shin (2012), who emphasizes that gross flows—particularly in assessing banking sector liabilities—offer critical insights into financial risks and vulnerabilities. However, studies that critique the measurement of capital flows through the current account do not dismiss its significance. The current account provides valuable information on long-term sustainability, can signal an impending crisis, indicates whether a country's deficit is financed by borrowing, and plays a key role in exchange rate determination. Nevertheless, savings and financing are not equivalent, meaning the current account alone cannot fully explain the magnitude and direction of capital flows. As Borio and Disyatat (2016, p. 7) state, "The current account represents the exchange of net wealth, but not financial flows." As a result, it does not reveal the total volume of investment, nor does it indicate the source or direction of investment, which is essential for understanding Lucas's paradox. These considerations have significantly influenced research variables in studies on Lucas's paradox, shifting the focus toward gross capital inflows and outflows.

Mehigan (2018), in the OECD report *Code of Liberalisation of Capital Movements*, similarly underscores the importance of these factors. Before the mid-1990s, gross inflows and net capital flows in OECD countries moved in parallel. However, since then, their patterns have diverged significantly. Similar synchronized movements were observed across most countries and regional groups. Forbes and Warnock (2012) note that, from the 1980s until the mid-1990s, gross inflows were

essentially a mirror image of net capital flows, leading researchers to consider gross inflows an insignificant variable. Additionally, a key reason for prioritizing net flows over gross flows was data availability. With the exception of a few developed countries, data on gross inflows and outflows were scarce, while current account data were widely accessible.

Figure 1. illustrates the relationship between net capital flows (measured as the difference between inflows and outflows) and current account balances as a percentage of GDP for 198 countries in different country groups. The current account balance is shown with an inverted sign, as it mirrors net capital flows (adjusted for reserve changes and statistical discrepancies). In developed countries, current account balances closely align with net capital flows derived from financial accounts. However, for emerging markets and developing countries, the discrepancies are larger, and the current account balance does not accurately reflect net capital movements.

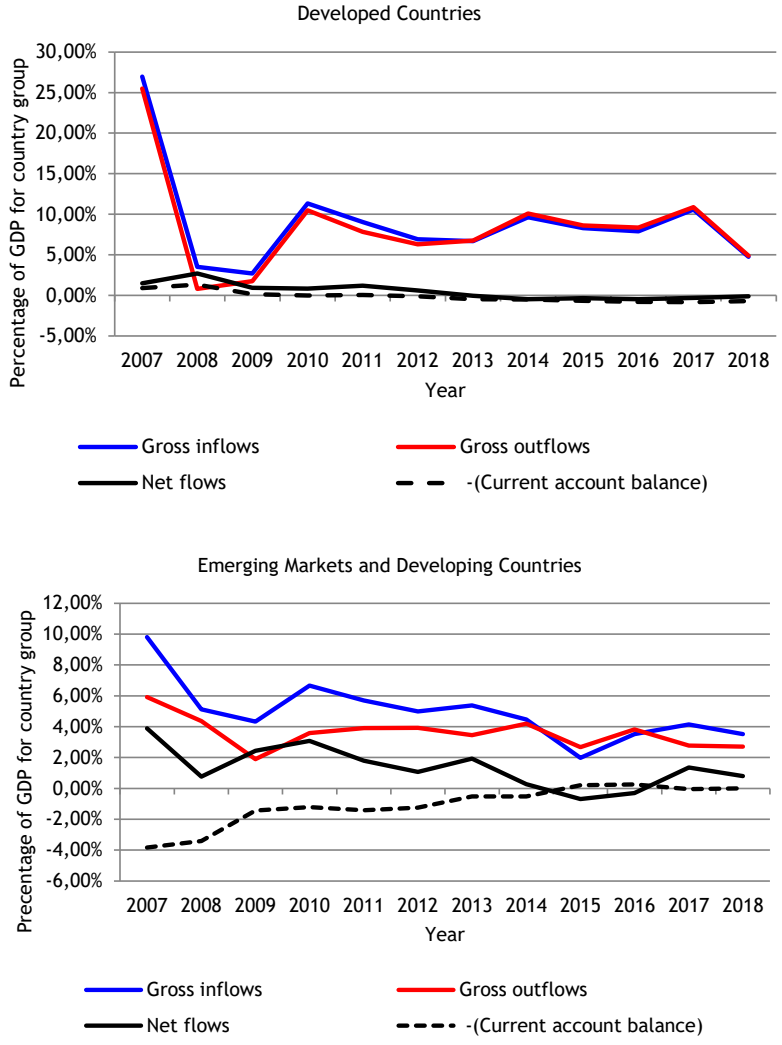

Figure 1. Relationship between Net Capital Flows and Current Account Balances

Source: Capital flow data are obtained from the International Monetary Fund (IMF) database *Balance of Payments Standard Presentation by Indicators* (in U.S. dollars). The current account balance is expressed with a negative sign (-). GDP data are sourced from the World Bank's *World Development Indicators* database, using current prices in U.S. dollars. Countries are categorized by development level according to the IMF classification: 40 developed countries and 158 emerging markets and developing economies.

The data clearly show that gross capital flows are significantly more volatile, while net capital flows remain relatively stable. Sharp declines in gross flows did not translate into corresponding changes in net capital movements. Moreover, there are notable differences between country groups. Net capital flows in developing economies and emerging markets are more volatile than those in advanced

economies. Similar conclusions were drawn by Pagliari and Hanna (2017), who demonstrated that gross capital inflows to developing countries tend to be more volatile than outflows.

One of the first studies to focus on gross capital flows was conducted by Lane and Milesi-Ferretti (2001), highlighting the rapid expansion of both capital inflows and outflows. The authors emphasize that "a country can maintain a persistent current account deficit while simultaneously reducing external liabilities (gross capital inflows) relative to GDP" (Lane and Milesi-Ferretti, 2001, p. 74). Before the global financial crisis, gross capital flows significantly exceeded net capital flows, leading Obstfeld (2012) to conclude that gross flows were the primary channel for transmitting financial instability.

Broner et al. (2013) analysed gross flows across income-based country classifications using World Bank categories and found that gross flows exhibit far greater volatility than net flows. This difference becomes even more pronounced during periods of severe market disruptions. Following the financial crisis, research on capital flows has increasingly focused on gross flows and has also begun differentiating capital by type (e.g., Milesi-Ferretti and Tille, 2011). Consequently, studies examining *push* and *pull* factors now yield different conclusions depending on the type of capital being analysed.

Most research on gross flows is centered on developing economies, with significantly less focus on advanced economies. Historically, developing countries experienced relatively low levels of gross capital outflows, leading research efforts to focus primarily on inflows. Foreign capital inflows have had a much stronger impact on the economies of developing nations compared to capital outflows. However, the liberalization of current accounts and the increasing trend toward financial integration in emerging and developing markets have also stimulated gross capital outflows. As a result, outflows are now recognized as a critical variable in capital flow research.

The financial crisis demonstrated that openness, integration, and globalization do not necessarily bring only positive economic outcomes for these countries. According to Pagliari and Hanna (2017), capital flows to developing economies are largely influenced by domestic economic conditions, as well as the size and depth of their financial systems. Additionally, these economies are more vulnerable to external shocks due to weaker economic and political stability. Large capital inflows are predominantly channelled through the banking sector. Ultimately, capital movements into developing and emerging market economies are highly sensitive to *push* factors and are largely beyond the control of domestic policymakers.

The indications of Lucas's paradoxical capital flows can be observed in the graphs in Figure 1. Specifically, gross capital flows—both inflows and outflows—are significantly larger in developed countries compared to developing countries. This clearly suggests that capital flow diversification is much greater among the more advanced economies.

While net capital flows, which represent the difference between capital inflows and outflows, remain important, the scale and behaviour of gross capital flows provide a more comprehensive understanding of the volume and direction of capital moving into or out of a country. In the context of Lucas's paradox and the allocation puzzle, understanding the precise direction of capital flows is crucial. Despite extensive research, net capital flows alone are insufficient to draw definitive conclusions. Additionally, capital flows from foreign and domestic agents are driven by different factors.

The experience of the 2008 financial crisis, which saw significant fluctuations in gross flows but relatively stable net flows, along with notable differences in capital behaviour depending on its type, has introduced a new framework for analysing paradoxical capital reversals. The current account reflects the transfer of net wealth but does not fully capture financing flows. As a result, unlike gross capital flows, a current account surplus or deficit does not accurately determine the volume or direction of capital, which is essential in explaining Lucas's paradox.

A decrease in net capital flows can result from either a sudden stop or a rapid outflow. Market shocks, such as financial crises, do not necessarily alter net capital flows, which tend to remain relatively stable. Obstfeld and Taylor's (2004) research shows that since 1980, gross capital flows in OECD countries have quadrupled, whereas net capital flows have remained relatively small and stable.

One of the most significant studies on Lucas's paradox and the allocation puzzle within the EU is the 2014 work by Herrmann and Kleinert. The authors argue that Lucas's paradox, as originally described in Lucas's 1990 paper, applies strictly to net capital flows. They consider the inclusion of

gross flows in the analysis to be “controversial” (Herrmann and Kleinert, 2014, p. 18). However, they acknowledge that the findings differ depending on whether net or gross flows are examined. Specifically, when focusing on net flows, Lucas’s paradox is not confirmed in EU countries, whereas the paradox is evident when gross flows are considered. The authors express a similar view regarding the allocation puzzle, dismissing the significance of gross flows in the analysis.

Research on Lucas’s paradox and the allocation puzzle has not reached a consensus on which type of capital should be used to study the magnitude and direction of capital flows. Therefore, the objective of this study is to determine which type and category of capital should be employed in analysing Lucas’s paradox and the allocation puzzle. Given that numerous studies primarily focus on the global level or specific country groups, while research specifically addressing the European Union remains limited, this study is conducted exclusively on EU member states.

2 METHODS

In this study, net capital flows were analysed using current account data, following the approach of most pre-financial crisis studies, followed by gross capital flows using financial account data, as per the post-crisis literature. The study examined the stability and procyclicality of gross inflows and outflows, as well as net capital flows, based on the work of Broner, Didier, Erce, and Schmikler (2013). The research focused on EU member countries from 1995 to 2018, divided into two periods: the first being the EU expansion in 1995, which also included the fourth enlargement, and the second conditioned by the 2008 financial crisis. This timeframe encompasses the pre-crisis, crisis, and post-crisis periods.

The study proposed two hypotheses:

H1) Net capital flows in European Union countries are more stable than gross capital flows.

H2) Gross capital flows in European Union countries, including capital inflows and outflows, are procyclical.

In the first step, gross capital outflows (GCO), capital inflows (GCI), and net capital (NC) as the difference between inflows and outflows, normalized for GDP trends, were analysed. The countries were divided into eurozone and non-eurozone nations, and based on classifications by the European Commission and similar studies (Caraveli, 2016), countries were further classified into core and peripheral. The core includes countries with a higher GDP per capita than the EU28 average over the last 10 years, while the peripheral countries have a GDP per capita below the average. (Core: Belgium, Germany, Ireland, France, Italy, Luxembourg, Netherlands, Austria, Finland, Denmark, Sweden, UK. Periphery: other EU countries.) For statistical review, the period was split into two phases: pre-crisis (1995–2017) with 13 observations, and crisis and post-crisis (2008–2018) with 11 observations.

In the second step, the procyclicality of gross flows was analysed through linear regression and expressed by the following equations:

The equations for the analysis are as follows:

$$GI_{it} = \beta GO_{it} + \varepsilon_{it}$$

$$GO_{it} = \beta GI_{it} + \varepsilon_{it}$$

Data for gross capital inflows (GI) and gross capital outflows (GO) were collected from the International Monetary Fund's database "Balance of Payments: Standard Presentation by Indicators"; in US dollars. Net capital (NC) is the difference between GI and GO. The GDP trend (TGDP) was calculated using the Hodrick-Prescott filter with a parameter of 100 for annual data series based on nominal GDP data in US dollars, collected from the World Bank’s World Development Indicators database. The analysis was conducted using the Stata16 software package.

3 RESULTS

The graphs in Figure 2 depict a strong simultaneous movement between gross capital outflow and gross capital inflow, indicating that inflows from non-residents and outflows from residents move almost in parallel. As inflows from foreign agents increase, outflows from domestic agents also rise,

and vice versa. This simultaneous movement is clearly visible both in the pre-crisis period and during and after the crisis. Comparing the movements of GO and GI with net capital flows (NC) reveals very different behaviours of capital flows. The largest discrepancies between gross and net capital flows are seen at the onset of the 2008 crisis when gross capital experiences a significant decline, while net flows remain relatively stable throughout the observed period. This indicates that gross capital flows are more volatile than net capital flows. These characteristics of capital flows are consistent within both eurozone countries and non-eurozone countries. Non-eurozone countries exhibit greater fluctuations in gross capital flows compared to eurozone countries, especially during the crisis; however, due to the simultaneity of these flows, this difference is not visible in net capital flows.

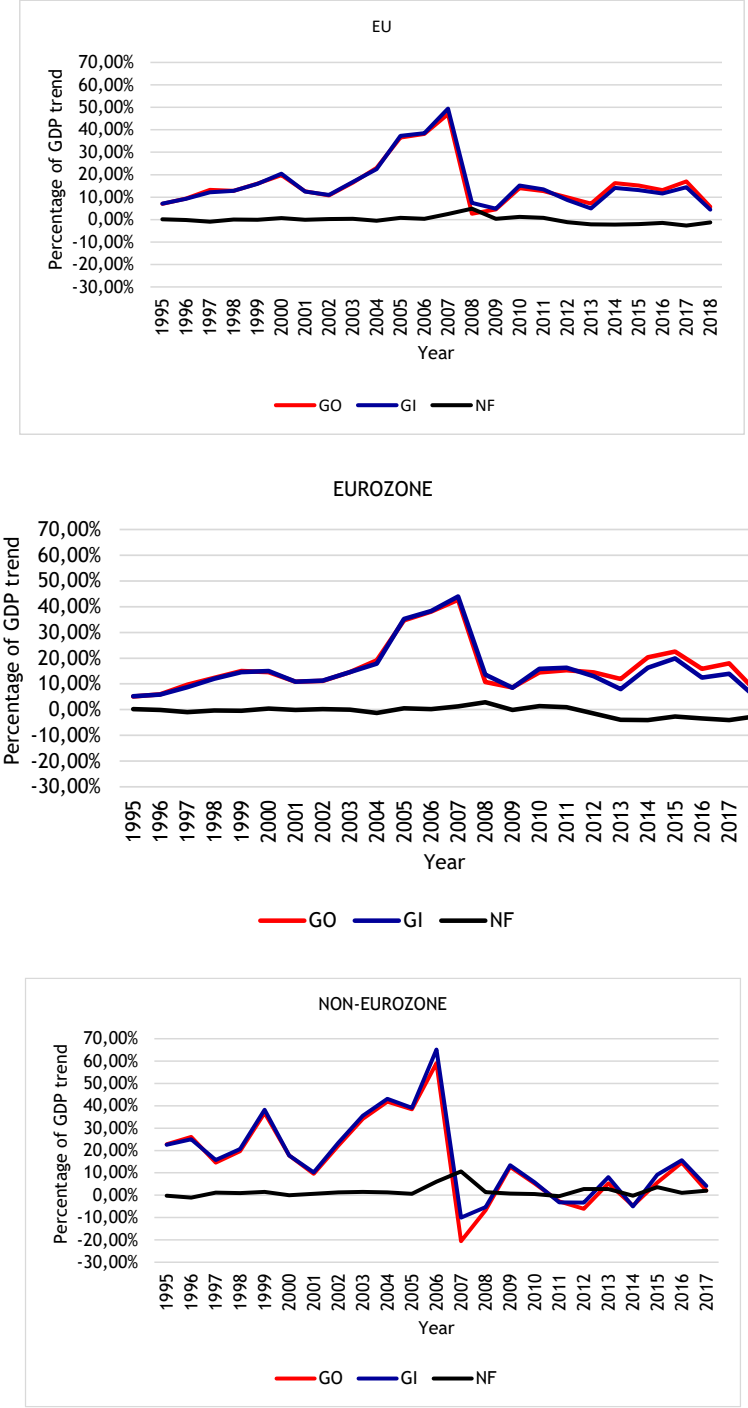

Figure 2. Gross and Net Capital Flows in the EU, Eurozone and Non-Eurozone, as a Percentage of GDP Trend

Source: see Figure 1.

Significant differences in capital flows are observed in core and peripheral countries (Figure 3) compared to the difference between countries that have adopted the euro and those that have not. Core countries exhibit greater capital fluctuations than peripheral countries when compared to GDP trends. From 1995 to 2008, both groups of countries show an increase in both capital inflows and outflows, with the EU core experiencing a rise from 10% at the beginning of the period to as high as 60% in the year before the crisis, while the peripheral countries' percentage stands at 30% of GDP. This same difference is evident in the decline at the start of the crisis. Before the crisis, gross outflows and inflows in the EU core were almost identical, but after the crisis, outflows exceeded inflows. On the other hand, capital inflows to the periphery were greater than outflows until 2012, when net capital became negative. As seen in previous country groupings, this division highlights much larger fluctuations in gross capital flows and their simultaneous movements, which in turn leads to much smaller changes in net capital flows.

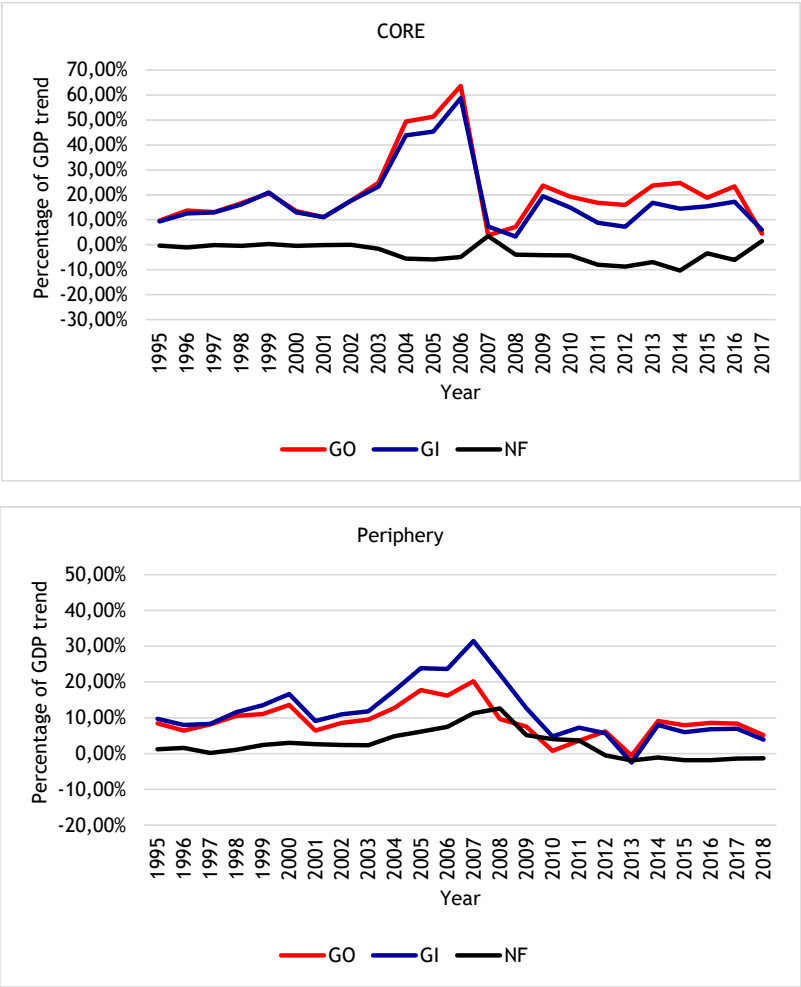

Figure 3. Gross and Net Capital Flows in the Core and Periphery of the EU

Source: see Figure 1.

The data analysis clearly shows that market shocks do not significantly affect net capital flows or, if they do, their impact is considerably smaller. Therefore, it is crucial to study changes in capital flows through gross capital flows - inflows, and outflows.

The statistics (Table 1) indicate that capital outflows (inflows) have decreased from 16.05% (15.92%) of the GDP trend before the crisis to 12.64% (11.57%) in the subsequent period for the EU as a whole. However, when viewed by region, the results are substantially different. Within the Eurozone, the medians remain constant across the two observed periods, whereas outside the Eurozone, there is a significant decline from 22.74% (22.95%) to only 2.16% (4.14%). A similar pattern can be seen when comparing the core to the periphery. Net capital flows in all samples exhibit significantly smaller

fluctuations of only a few percentage points in terms of the GDP trend. The results suggest that net capital flows are more stable than gross capital flows, and that gross capital flows are more stable in wealthier countries (the core) compared to poorer countries (the periphery). The greatest fluctuation in gross capital flows is observed in countries outside the Eurozone, leading to the conclusion that capital flows in the area with a single currency are, on average, more stable.

Table 1. Statistics summary

EU						
Alpha (significance level) 5%						
	GO	GI	NF	GO	GI	NF
	1995-2007	1995-2007	1995-2007	2008-2018	2008-2018	2008-2018
Count	13	13	13	11	11	11
Mean	20,21048	20,43826	0,22778	10,72151	10,1974	-0,52412
SD	12,54245	13,13843	0,82474	5,04334	4,22562	2,20992
Median	16,05716	15,92685	0,08525	12,64614	11,57131	-1,26967
EUROZONE						
Alpha (significance level) 5%						
	GO	GI	NF	GO	GI	NF
	1995-2007	1995-2007	1995-2007	2008-2018	2008-2018	2008-2018
Count	13	13	13	11	11	11
Mean	17,37816	17,36582	0,00721	14,49647	12,94588	-1,55059
SD	12,37409	12,73027	0,6355	4,74396	4,43226	2,4482
Median	14,51926	14,52154	0,0161	14,51562	13,65069	-2,5152
NON-EUROZONE						
Alpha (significance level) 5%						
	GO	GI	NF	GO	GI	NF
	1995-2007	1995-2007	1995-2007	2008-2018	2008-2018	2008-2018
Count	13	13	13	11	11	11
Mean	27,5196	28,54804	1,02844	0,42348	2,66364	2,24016
SD	13,86394	10,8831	0,8151	9,99782	8,49199	3,04774
Median	22,74096	22,95746	0,75462	2,16205	4,14208	1,3747
CORE						
Alpha (significance level) 5%						
	GO	GI	NF	GO	GI	NF
	1995-2007	1995-2007	1995-2007	2008-2018	2008-2018	2008-2018
Count	13	13	13	11	11	11
Mean	24,00628	22,45749	-1,54879	16,53365	11,90322	-4,63043
SD	18,41348	16,29688	2,28807	7,90656	5,49448	4,16076
Median	16,66051	16,21991	-0,44061	18,83767	14,46584	-4,31594
PERIPHERY						
Alpha (significance level) 5%						
	GO	GI	NF	GO	GI	NF
	1995-2007	1995-2007	1995-2007	2008-2018	2008-2018	2008-2018
Count	13	13	13	11	11	11
Mean	11,50761	15,09403	3,58642	6,02104	7,43757	1,41652
SD	4,3583	7,24318	3,09569	3,42721	6,07604	4,56131
Median	10,52524	11,82779	2,42733	7,52911	6,77219	-1,11663

The volatility in the variables GO and GI shows a decrease, while the volatility in the variable NC increases in all the observed groups. This volatility is higher for gross flows in core countries compared to peripheral countries, and it is greater before the crisis than in the period after. Despite the increase in NC volatility during and after the crisis, the volatility of gross capital flows is several times higher

than that of net capital flows, further suggesting greater stability in net capital flows. These findings align with the conclusions of Broner et al. (2013), who identified higher volatility in gross flows as well as in wealthier countries.

Based on the analysis results, hypothesis H1) is accepted: Net capital flows in European Union countries are more stable than gross capital flows.

The results of the analysis of the procyclicality of gross capital flows are presented in Table 2.

Table 2. Results of the regression analyses for H2)

EU					
$GO_{it} = \beta GI_{it} + \varepsilon_{it}$					
R	0,98975	*R-Squared*	0,97960	*Adjusted R-Squared*	0,97867
*GO = 0,81956 + 0,95537 * GI*					
	Coefficients	*Std Err*	*t Stat*	*p-value*	
Intercept	0,81956	0,56360	1,45414	0,16003	
GI	0,95537	0,02939	32,50345	0,00000	
$GI_{it} = \beta GO_{it} + \varepsilon_{it}$					
R	0,98975	*R-Squared*	0,97960	*Adjusted R-Squared*	0,97867
*GI = - 0,51917 + 1,02537 * GO*					
	Coefficients	*Std Err*	*t Stat*	*p-value*	
Intercept	-0,51917	0,60120	-0,86356	0,39714	
GO	1,02537	0,03155	32,50345	0,00000	
EUROZONE					
$GO_{it} = \beta GI_{it} + \varepsilon_{it}$					
R	0,98290	*R-Squared*	0,96609	*Adjusted R-Squared*	0,96454
*GO = 1,53064 + 0,94906 * GI*					
	Coefficients	*Std Err*	*t Stat*	*p-value*	
Intercept	1,53064	0,69945	2,18837	0,03955	
GI	0,94906	0,03791	25,03364	0,00000	
$GI_{it} = \beta GO_{it} + \varepsilon_{it}$					
R	0,98290	*R-Squared*	0,96609	*Adjusted R-Squared*	0,96454
*GI = - 1,02728 + 1,01794 * GO*					
	Coefficients	*Std Err*	*t Stat*	*p-value*	
Intercept	-1,02728	0,76876	-1,33629	0,19511	
GO	1,01794	0,04066	25,03364	0,00000	
NON-EUROZONE					
$GO_{it} = \beta GI_{it} + \varepsilon_{it}$					
R	0,99106	*R-Squared*	0,98220	*Adjusted R-Squared*	0,98140
*GO = - 1,66928 + 1,00512 * GI*					
	Coefficients	*Std Err*	*t Stat*	*p-value*	
Intercept	-1,66928	0,70034	-2,38352	0,02621	
GI	1,00512	0,02884	34,84609	0,00000	
$GI_{it} = \beta GO_{it} + \varepsilon_{it}$					
R	0,99106	*R-Squared*	0,98220	*Adjusted R-Squared*	0,98140

*GI = 1,92813 + 0,97720 * GO*					
	Coefficients	*Std Err*	*t Stat*	*p-value*	
Intercept	1,92813	0,65651	2,93694	0,00763	
GO	0,97720	0,02804	34,84609	0,00000	
CORE					
$GO_{it} = \beta GI_{it} + \varepsilon_{it}$					
R	0,97255	*R-Squared*	0,94585	*Adjusted R-Squared*	0,94339
*GO = 1,72815 + 1,06998 * GI*					
	Coefficients	*Std Err*	*t Stat*	*p-value*	
Intercept	1,72815	1,20020	1,43989	0,16398	
GI	1,06998	0,05458	19,60293	0,00000	
$GI_{it} = \beta GO_{it} + \varepsilon_{it}$					
R	0,97255	*R-Squared*	0,94585	*Adjusted R-Squared*	0,94339
*GI = - 0,57353 + 0,88399 * GO*					
	Coefficients	*Std Err*	*t Stat*	*p-value*	
Intercept	-0,57353	1,13459	-0,50550	0,61824	
GO	0,88399	0,04509	19,60293	0,00000	
PERIPHERY					
$GO_{it} = \beta GI_{it} + \varepsilon_{it}$					
R	0,90462	*R-Squared*	0,81833	*Adjusted R-Squared*	0,81007
*GO = 2,45438 + 0,56441 * GI*					
	Coefficients	*Std Err*	*t Stat*	*p-value*	
Intercept	2,45438	0,78228	3,13745	0,00479	
GI	0,56441	0,05670	9,95484	1,31071E-9	
$GI_{it} = \beta GO_{it} + \varepsilon_{it}$					
R	0,90462	*R-Squared*	0,81833	*Adjusted R-Squared*	0,81007
*GI = - 1,45397 + 1,44989 * GO*					
	Coefficients	*Std Err*	*t Stat*	*p-value*	
Intercept	-1,45397	1,47627	-0,98489	0,33538	
GO	1,44989	0,14565	9,95484	1,31071E-09	

The correlation coefficient for all observed sample groups is above 0.9 with p-values below 0.05, indicating statistical significance. A high positive correlation between gross capital outflows and gross capital inflows is evidence of the simultaneous movement and procyclicality of gross flows in EU countries.

Based on the results of the analysis, hypothesis H2) is accepted: Gross capital flows, including capital inflows and outflows, in the European Union are procyclical.

By proving both hypotheses, it is concluded that during periods of globalization, financial liberalization, and especially crises, the direction of capital flows and their dynamic correspondence can be determined by examining gross, but not net capital flows.

4 DISCUSSION

The results of the conducted analysis point to several significant findings:

- Net capital flows are less volatile than gross capital flows in all observed groups.

- Gross capital flows in higher-income EU countries and euro area countries are more volatile than flows in poorer countries and those outside the euro area.
- Gross capital outflows by domestic agents and gross capital inflows by foreign agents move simultaneously, even during market shocks, across all observed country groups.
- The high correlation between gross inflows and outflows demonstrates procyclicality, and since net flows are the difference between inflows and outflows, changes in capital flows cannot be inferred solely from net flows.

Given the results of the analysis and the conclusions on the procyclicality and volatility of capital flows in the European Union, for studies of the direction of capital flows (Lucas paradox) and dynamic correspondence (allocation puzzle), it is necessary to use data on gross capital flows, and not net capital flows.

5 CONCLUSION

The aim of this paper is to explain the implications of using gross capital inflows and outflows as variables, as opposed to net capital flows, in the analysis and research of the direction and dynamics of capital flows.

The results obtained suggest that for such studies, it is necessary to use gross categories of capital, and the traditional use of net categories as a variable should be abandoned. The conducted analyses also offer a potential solution to the problem of contradictory results in numerous studies and the insufficiently clear definition of the variables used in models. The conclusions of this paper lay the groundwork for further research into the Lucas paradox and the allocation puzzle.

Refrences

Akhtaruzzaman, M., Hajzer, C., & Owen, P. D. (2018). Does institutional quality resolve the Lucas Paradox? *Applied Economics*, Vol. 50, Issue 5, 455-474. https://www.tandfonline.com/doi/full/10.1080/00036846.2017.1321840?scroll=top&needAccess=true

Albuquerque, R., Bauer, G. H., & Schneider, M. (2004). International equity flows and returns: a quantitative equilibrium approach. *European Central Bank Working Paper Series* No. 310, 1-71. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=472424

Alfaro, L., Kalemli-Ozcan, S., & Volosovych, V. (2008). Why doesn't capital flow from rich to poor countries? An empirical investigation. *The Review of Economics and Statistics*, 90(2), 347-368. https://direct.mit.edu/rest/article-abstract/90/2/347/57727/Why-Doesn-t-Capital-Flow-from-Rich-to-Poor?redirectedFrom=fulltext

Borio, C., & Disyatat, P. (2016). Capital flows and the current account: Taking financing (more) seriously. *Puey Ungphakorn Institute for Economic Research, Discussion Paper* No. 14. https://ideas.repec.org/p/pui/dpaper/14.html

Broner, F., Didier, T., Erce, A., & Schmukler, S. L. (2013). Gross capital flows: Dynamics and crises. *Journal of monetary economics*, 60, 113-133. https://www.sciencedirect.com/science/article/abs/pii/S0304393212001675

Busse, M., & Hefeker, C. (2007). Political risk, institutions and foreign direct investment. *European Journal of Political Economy*, Vol. 23(2), 397-415. https://www.sciencedirect.com/science/article/abs/pii/S0176268006000267

Calderon, C., & Kubota, M. (2013). Sudden stops: Are global and local investors alike? *Journal of International Economics,* No. 89, 122-142. https://www.sciencedirect.com/science/article/abs/pii/S0022199612001006

Caraveli, H. (2016). Global imbalances and EU core-periphery division. *World Review of Political Economy* Vol.7, No. 1, 29-55. https://www.jstor.org/stable/10.13169/worlrevipoliecon.7.1.0029?seq=1

Forbes, K., & Warnock, F. E. (2012). Capital flow waves: Surges, stops, flight, and retrenchment. *Journal of International Economics* 88, 235-251. https://www.sciencedirect.com/science/article/abs/pii/S0022199612000566

Herrmann, S., & Kleinert, J. (2014). Lucas paradox and allocation puzzle - is the euro area different? *Discussion paper Deutsche Bundesbank* No 06/2014. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2796952

Hobza, A., & Zeugner, S. (2014). The "imbalanced balance" and its unravelling: current accounts and bilateral financial flows in the euro area. *European Commission Economic papers*, No 520. https://ec.europa.eu/economy_finance/publications/economic_paper/2014/ecp520_en.htm

IMF (2009) Balance of Payments and International Investment Position Manual BPM6. https://www.imf.org/external/pubs/ft/bop/2007/bopman6.htm

Jensen, N.M. (2003). Democratic governance and multinational corporations: political regimes and inflows of foreign direct investment. *Int Org* 57(03), 587-616. https://www.cambridge.org/core/journals/international-organization/article/abs/democratic-governance-and-multinational-corporations-political-regimes-and-inflows-of-foreign-direct-investment/246025D12F8982BCC871F6398EB57720

Lane, P. R., & Millesi-Ferretti (2001). Long-Term Capital Movements, *NBER Macroeconomics Annual*, Vol. 16, 73-116. https://www.nber.org/papers/w8366

Mehigan, C. (2018). Measurement and identification of capital inflow surges. *Review of the OECD Code of Liberalisation of Capital Movements* 2/REV1, 1-16. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.oecd.org/investment/investment-policy/Measurement-identification-of-capital-inflow-surges-technical-note.pdf

Millesi-Ferretti, G., & Tille C. (2011). The great retrenchment: international capital flows during the global financial crisis. *Economic Policy*, April (11), 285-342. https://academic.oup.com/economicpolicy/article-abstract/26/66/289/2918382?redirectedFrom=fulltext

Obstefld, M. & Taylor, A. M. (2004). Global Capital Markets. *New York: Cambridge University Press.* https://books.google.si/books?hl=en&lr=&id=KhXl9OT0WigC&oi=fnd&pg=PR9&dq=Obstfeld,+M.+%26+Taylor,+A.+M.+(2004).+Global+Capital+Markets.+New+York&ots=nXBnNnJ9uO&sig=NJZYQCSQvxUrPWt4JWwYILh9xQ4&redir_esc=y#v=onepage&q&f=false

Obstfeld, M. (2012). Does current account still matter? *American Economic Review, American Economic Association,* Vol 102(3), 1-23. https://www.aeaweb.org/articles?id=10.1257/aer.102.3.1

Pagliari, M. S., & Hannan, S. A. (2017). The Volatility of Capital Flows in Emerging Markets: Measures and Determinants. *IMF Working Paper* WP/17/41, 1-57. https://www.imf.org/en/Publications/WP/Issues/2017/03/07/The-Volatility-of-Capital-Flows-in-Emerging-Markets-Measures-and-Determinants-44725

Portes, R., & Rey, H. (2005). The determinants of cross-border equity flows. *Journal of International Economics* 65, 269-296. https://www.sciencedirect.com/science/article/abs/pii/S0022199604000716

Rey, H. (2013). Dilemma not trilemma: The global financial cycle and monetary policy independence. *Federal Reserve Bank of Kansas City Economic Symposium*, 285-333. https://ideas.repec.org/p/nbr/nberwo/21162.html

Shin, S. H. (2012). Global banking glut and loan risk premium. *IMF Annual research conference* November 10-11, 2011. https://www.researchgate.net/publication/254073025_Global_Banking_Glut_and_Loan_Risk_Premium

Toš, T, & Kvesić, M. (2017) Problem in analysing the Lucas Paradox: Why we don't have an answer? *Third international scientific conference ERAZ 2017, Belgrade,* 54-59. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://bib.irb.hr/datoteka/995204.zbornik_eraz_2017_final_2.pdf