Applied Economics Journal Vol. 28 No. 1 (June 2021): 18–42

ISSN: 2586-9124 (PRINT)
ISSN: 2586-9132 (ONLINE)

Received: 20 July 2020
Received in revised form: 4 September 2020
Accepted: 12 September 2020

Impact of Domestic Public Borrowing on Financial Development: Evidence from EU Transition Economies

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Abstract

Improvements in the financial sector have been suggested as a significant factor of economic growth. For that reason, it is crucial to reveal the determinants of financial sector development to ensure appropriate policy making. In this regard, this paper explores the influence of public borrowing from domestic money banks together with FDI inflows and remittances on the development of the financial sector over the period 1996–2017 in 11 EU transition economies with second-generation cointegration and causality analysis. The causality analysis discloses that domestic public borrowing had a significant influence on financial development. On the other side, the cointegration analysis revealed findings supporting both the safe asset view and the lazy bank view. Furthermore, a positive weak influence of FDI inflows and remittances on financial sector development was revealed in the long run.

Keywords: domestic public borrowing, FDI inflows, remittances, financial development, panel cointegration and causality analyses
JEL Classification: C23, F24, G10, G20, H6

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1. Introduction

Financial sector has been considerably globalized and expanded by the ample contributions of loosening the barriers over transnational capital flows. The expanding and globalized financial sector has many economic implications theoretically. First, financial sector can make a contribution to the economic growth through increasing the fund mobilization, raising the efficiency in fund allocation and savings (e.g. see Greenwood & Jovanovic, 1990; Wurgler, 2000; Levine, 2005; Beck et al., 2008; Kose et al., 2010; Bhaduri & Bhattacharya, 2018; Rapp & Udoieva, 2018). Furthermore, improvements in the financial sector can raise the alternative financing opportunities for early-stage entrepreneurs and in turn feed the economic growth (e.g., see Hassan et al., 2011; Arellano et al., 2012). Reducing informational asymmetries and enhancing risk sharing opportunities, financial development has a large casual effect in the reduction of macroeconomic volatility (Bernanke et al., 1999; Raddatz, 2006). A positive influence of financial development on economic growth has been verified by many researchers (e.g. see Rajan & Zingales, 1998; Boyd et al., 2001; Beck et al.,2003; Claessens & Laeven, 2003; Chinn & Ito, 2006; Akinci et al., 2014; Pradhan et al. 2017; Alexiou et al., 2018; Bist, 2018). As a result, the raising economic performance through financial sector development in turn can decrease the poverty and income inequality (Jalilian & Kirkpatrick, 2002; Jeanneney & Kpodar, 2011). The relevant literature also documents that financial development alleviates the shadow economy size by introducing the funds in better economic conditions for businesses and incentivizing informal entrepreneurs to legitimacy, so it has effects to lower the rate of tax evasion (Blackburn et al., 2012; Capasso & Jappelli, 2013; Berdiev & Saunoris, 2016). Moreover, foreign direct investments are promoted by financial developments of source and destination countries with direct and indirect effects (Desbordes & Wei, 2017).

In this context, many scholars have researched the determinants of financial sector development given its positive economic impacts. Economic growth, shares of public and private sectors in the financial system, financial liberalization, liberalization of foreign trade, institutional structure and human capital, macroeconomic policies and consistency, legal and regulatory environment are among the determinants of financial development (e.g. see McKinnon, 1973; Shaw, 1973; Chin & Ito, 2002; Cottarelli et al., 2003; Rajan & Zingales, 2003; Acemoglu et al., 2004; Hauner, 2009).

However, the effect of domestic public borrowing on the development level of financial sector has not been extensively investigated in the relevant literature as seen in literature review. Two views, safe asset view and lazy bank view, have been suggested for the interaction between public borrowing and financial development. Lazy bank view suggests that banks with greater public debt instruments increase their profitability but decrease their efficiency and in turn lowers financial depth in time. On the other side, safe asset view asserts that limited amount of public borrowing supports financial development (Hauner, 2009). So, the net influence of public borrowing on financial sector development depends on public borrowing level and country specific characteristics.

Furthermore, the influence of FDI inflows and remittances, the featured characteristics of globalization on financial sector development also have been relatively little researched. FDI inflows may positively influence financial development through raising the funds in financial markets, but FDI inflows as a competitor for domestic financial markets can also have negative influence on financial development (Levine, 1997; Desbordes & Wei, 2017). On the other side, a complementary or substitutable interaction between remittances and financial sector is expected based on the employment of remittances (Gupta et al., 2009). Remittances are able to positively affect financial development in case remittances are transferred via financial institutions and/or employed in financial markets. But remittances also can negatively affect financial development if remittances are employed as an alternative financing tool against the financial sector (Giuliano & Ruiz-Arranz, 2009) or remittances transfer is made through unrecorded channels to minimize the costs. Consequently, the net influence of FDI inflows and remittances on financial sector development can be different.

The post-communist EU members have made a transition to liberal market economies from command economies in the late 1980s and have undergone economic and institutional transformation to date. The EU transition economies have experienced considerable improvements in financial development and also attracted significant amount of FDI inflows and remittances especially with the help of EU membership. Therefore, the effect of domestic public borrowing together with FDI inflows and remittances on financial development was analyzed in sample of EU transition members. The study aims to make a contribution to the relevant literature in three ways. First, in the limited relevant literature, the studies analyzing the influence of public borrowing on financial development have generally used financial depth proxies for financial development. But

our paper employed financial development index reflecting the depth, accessibility and efficiency of financial system by IMF (2020) unlike from the related literature. The use of second-generation econometric tests regarding cross-sectional dependence and heterogeneity is the second contribution of the paper and leads us to obtain relatively more reliable results. Thirdly, the relevant literature used many institutional and economic indicators for possible determinants of financial development, but impact of FDI inflows and remittances have been rarely explored. Therefore, FDI inflows and remittances are included as control variables in the model. The remaining section of the paper proceeds as following: the second section of the paper summarizes the literature associated with the topic, and data and method are presented in Section 3. Then, the results and inferences of empirical analyses are represented in Section 4, and finally, Section 5 comprises the conclusion part of the study.

2. Literature Review

The main objective of the paper is to analyze the effect of domestic public borrowing together with FDI inflows and remittances on financial development considering the related literature.

2.1. Theoretical Literature Review

In the relevant theoretical literature, safe asset and lazy bank views have been suggested for the effect of public borrowing on financial development. The safe asset view suggests that the public debt, which is the safest asset in terms of credit risk and liquidity in financial markets, eases the financial intermediation and improves the stability in the financial markets and in turn makes a contribution to the financial development (Kumhof and Tanner, 2005).

On the other side, lazy bank view asserts that increasing public debts pose an obstacle for financial development through slowing financial system and decreasing the efficiency (Hauner, 2009). Furthermore, the raising the share of public sector in debt markets can harm the function of financial system' channeling the funds to the most productive investments among the alternatives. So, both impacts can be experienced depending on the public borrowing level, financial system specific features.

The theoretical view about the impact of FDI inflows on financial development has stayed inconclusive. On the one hand FDI inflows may positively influence financial development through raising the funds in financial markets, on the other hand FDI inflows as a competitor for domestic

financial markets can also have negative influence on financial development (Levine, 1997; Desbordes & Wei, 2017). Lastly, the impact of remittances on financial development is based on whether remittances are used in financial markets or as an alternative financing tool against the financial sector (Gupta et al., 2009; Giuliano & Ruiz-Arranz, 2009).

2.2. Empirical Literature Review

The economic implications of financial sector development have motivated the scholars to explore the determinants of financial development. The aforementioned studies have mainly focused on the impact of institutional development, macroeconomic variables such as income level, the size of economy, economic growth, investment, and inflation, trade and financial liberalization, population, ethnic characteristics of societies, and geographic factors on financial development (see Shaw, 1973; McKinnon, 1973; Greenwood & Jovanovic, 1990; Levine, 1997; La Porta et al., 1997, Demirgüç-Kunt & Detragiache, 1998; Acemoglu *et al.,* 2001; Bekaert *et al.,* 2002; Stulz & Williamson, 2003; Beck *et al.,* 2003; Do & Levchenko, 2004; Levine, 2005; Chinn & Ito, 2006; Malik & Temple, 2009; Baltagi *et al.,* 2009; Huang, 2010; Naceur et al., 2014; Abubakar & Kasim, 2018; Ibrahim & Sare, 2018; Marvasti & Razzaghi, 2020). However, the relatively few scholars have explored the influence of public sector borrowing on financial sector development.

In this context, some scholars have researched the influence of public sector borrowing on financial sector development proxied by different indicators and reached mixed findings supporting lazy bank and safe asset view (e.g. see Hauner, 2009; Ismihan & Ozkan, 2012; Altayligil & Akkay, 2013; Ilgün, 2016). On the other side, relatively more scholars have explored the influence of public sector borrowing on private credits by banks and reached the findings supporting the crowding out hypothesis (e.g. Caballero & Krishnamurthy 2004; Emran & Farazi, 2008 and 2009, Hauner, 2009; Bua et al., 2014; Ayadi et al., 2015; Benayed & Gabsi, 2020).

In the relevant empirical literature, Hauner (2009) analyzed the impact of public sector borrowing on financial development in 79 emerging and developing countries through threshold regression analysis and discovered that public sector borrowing positively affected the financial development until a certain threshold (average public borrowing of the panel) of public borrowing (10% for the panel), but public sector borrowing negatively affected the financial development after the threshold level. However, Ilgün (2016) explored the same nexus for 18 emerging economies through cointegration analysis and revealed a negative long run effect of government borrowing on financial development. Altayligil and Akkay (2013) investigated the same nexus for an emerging

Turkish economy through cointegration approach and reached the same findings with Ilgün (2016). Hauner (2009) employed a different methodological approach and revealed the negative effect of public sector borrowing on financial development appeared after a certain threshold level. However, the other two scholars used the similar methodology for emerging economies and reached the same findings.

In one of the early empirical analyses exploring the impact of public borrowing on financial development, Hauner (2009) researched the influence of public sector borrowing on financial development proxied by liquid liabilities of the banking system and total bank credit in 73 emerging or developing economies with data of 2001–2003 average and changes between 1980–1982 average and 2001–2003 average through regression analysis and revealed that the impact of public sector borrowing on financial development varied depending on public borrowing level. The public sector borrowing until a certain threshold (here 10% of GDP) positively affected financial development, but higher public borrowing than the threshold level negatively affected financial development. So, the optimal public borrowing supports the financial development, but too much public borrowing hurts the financial sector development. Lastly, the bank level analysis by Hauner (2009) revealed that banks generally investing in public debt instruments were relatively more profitable, but less efficient after a certain threshold level (here 10% of GDP).

Ismihan and Ozkan (2012) developed a theoretical model to project the influence of public borrowing on financial sector development. In this context, the theoretical model predicts that an increase in public borrowing crowds out the private sector in the financial markets in case public sector is a dominant actor in financial system and in turn negatively affects the financial sector development. On the other side, Altayligil and Akkay (2013) investigated the influence of public debt on financial sector development proxied by index of Levine (2002) in Turkey for the period 2002-2012 through cointegration analysis and revealed a negative influence of domestic public debt on financial development. Ilgün (2016) investigated the long-run influence of public borrowing on financial development proxied by an index from broad money, private credit by banks and other financial institutions, stock market total value traded and stock market capitalization in 18 emerging economies over the period 1987–2013 through second-generation cointegration test. The results suggested that government borrowing negatively affected financial development in the long run.

In the related literature, some scholars have concentrated upon the crowding out effect of public borrowing on private borrowing and the scholars have revealed a crowding out effect of

public borrowing on private borrowing for emerging and developing economies through different methodological approaches.

In this regard, Emran and Farazi (2008) analyzed the influence of public borrowing on the private credits by domestic banks in 25 developing countries and discovered a crowding-out effect on private credits by banks. So, their findings supported lazy bank view. Hauner (2009) also researched the influence of public sector borrowing on private credits by banks in 73 emerging or developing economies with data of 2001–2003 average and changes between 1980–1982 average and 2001–2003 average through regression analysis and revealed a crowding effect of public borrowing on private borrowing.

Emran and Farazi (2009) conducted a similar study for 60 developing countries and reached the same findings. Ali et al. (2016) also explored the influence of public borrowing on private credits in Pakistan for the period of 1972-2015 through ARDL approach and disclosed a negative influence of public borrowing on private borrowing. Janda and Kravtsov (2017) explored the influence of domestic public borrowing on financial development, private credits, and bank performance in 26 countries from Central Eastern Europe, the Balkan and the Baltic regions for the period of 1995-2014 through regression analysis and discovered a crowding effect of public borrowing on private credits and positively affected banking sector efficiency in the short run. Lastly, Benayed and Gabsi (2020) explored the influence of domestic public borrowing on bank credit to the private sector in 20 low income Sub-Saharan African countries during the period 2000-2010 through traditional and dynamic regression analyses and revealed an inverted-U relationship between domestic public borrowing and private credits by banks. The domestic public borrowing had a crowding-out influence on private credits by banks until 52% of GDP.

In the empirical literature, most of the scholars have researched the influence of financial sector on FDI inflows, but a few scholars have focused on the influence of FDI inflows on financial development and disclosed a positive contribution of FDI inflows to financial development (Abzari et al. 2011; Sahin & Ege 2015; Gebrehiwot et al. 2016; Henri et al., 2019). On the other side, the empirical literature on the impact of remittances on financial development have generally revealed a positive influence of remittances on financial development (e.g., see Gupta et al., 2009; Demirgüç-Kunt et al., 2011; Aggarwal et al., 2011; Shahzad et al., 2014; Kakhkharov, 2014; Williams, 2016; and Karikari et al., 2016). However, relatively few scholars have revealed a negative or insignificant influence of remittances on financial development (e.g., see Brown et al., 2013;

Kumar, 2013; Githaiga & Kabiru, 2014; Bhattacharya et al., 2018; Polat, 2018; Olayungbo & Quadri, 2019)

3. Data and Econometric Methodology

In our research, the influence of domestic public borrowing together with FDI inflows and remittances on development of financial sector has been explored. Therefore, the causality interaction was analyzed by Dumitrescu and Hurlin (2012) causality test, and the long run influence of domestic public borrowing on financial sector development was investigated through Westerlund and Edgerton (2008) cointegration test.

3.1. Data

In the related literature, different types of indicators such as the private credit-GDP ratio, stock market capitalization to GDP ratio, broad money supply to GDP ratio and domestic credits given by banks to GDP ratio are used to represent financial development and construct financial indices (King & Levine, 1993; Lynch, 1996; Levine, 1997; ; Kar & Pentacost, 2000; Levine, 2005; Demirgüç-Kunt & Levine, 2009; Dabla-Norris & Srivisal, 2013; Svirydzenka, 2016). In the study, financial development has been represented by financial development index of IMF (2020). The Financial Development Index (FINDEV) enables us to evaluate countries on the bases of depth, access, and efficiency of financial institutions and markets (see Svirydzenka, 2016 for methodological issues about the index). Furthermore, the recent relevant literature (see Choi, 2019; Edge & Liang, 2019; Ganda, 2019) has used the index for financial development.

The variable of domestic public borrowing was represented through credit by domestic money banks to the government and state-owned enterprises as a percent of GDP considering Hauner (2009) and Ilgun (2016). Many institutional and economic variables have been revealed to be determinants of financial development in the related literature. In the study, remittances and FDI inflows were taken as control variables considering the limited literature on the interaction among remittances, FDI inflows and financial development. The control variables of personal remittances as a percent of GDP and FDI inflows as a percent of GDP inflows were included in the econometric model. All the explanatory variables have been obtained from World Bank databases as seen in Table 1.

Table 1: Data Description

Variables	Description	Source
FINDEV	Financial Development Index	IMF (2020)
PUBLIC	Ratio between credit by domestic money banks to the government and state-owned enterprises and GDP.	World Bank (2020a)
FDI	Foreign direct investment, net inflows (% of GDP)	World Bank (2020b)
REM	Personal remittances, received (% of GDP)	World Bank (2020c)

The sample of the study consists of 11 post-commumist EU members (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia). All the variables are yearly and the study period is 1996-2017 because the variable of domestic public debt for the countries existed for the determined period.

The statistical packages of Stata 14.0 and Eviews 10.0 have been used in the econometric analysis of the study. The dataset summary characteristics are shown in Table 2. The mean of financial sector development is about 0.34 and displays no significant variations among the countries. The mean of credit to government and state owned enterprises as a percent of GDP is about 11.81% and the average FDI inflows is about 5.1% of GDP, but both variables exhibit significant variations among countries. Lastly, the mean of remittances is about 1.87% of GDP and displays relatively little variations among the countries.

Table 2: Dataset's Main Characteristics

	FINDEV	PUBLIC	FDI	REM
Mean	0.347929	11.81215	5.104897	1.875664
Median	0.346438	11.59755	3.836723	1.416572
Maximum	0.575378	32.72550	54.64873	8.127154
Minimum	0.107236	1.021820	-15.83879	0.027295
Std. Dev.	0.096658	7.025890	6.787269	1.630030
Skewness	0.010412	0.574879	4.205861	1.075781
Kurtosis	2.815542	2.995549	28.68174	3.716419

Source: Authors' own elaborations based on the IMF (2020) data of Financial Development Index (FDI) and World Bank (2020a, b and c) data of World Development Index (WDI).

The main objective of the study is to analyze the impact of public sector borrowing on financial development. We also selected FDI inflows and remittances as the independent variables, because a limited number of studies have explored the impact of the variables on financial development in the literature about the determinants of financial development. In the model, financial development (FINDEV) was proxied by financial development index of IMF, public sector borrowing (PUBLIC) was proxied by bank credits to the government and state-owned enterprises, FDI inflows (FDI) and remittances (REM) were proxied FDI inflows and personal remittances as a percent of GDP. Therefore, the following econometric model is formed considering the relevant literature.

$$FINDEV_{it} = \alpha_0 + \beta_1 PUBLIC_{it} + \beta_2 FDI_{it} + \beta_3 REM_{it} + u_{it} \qquad (1)$$

The influence of domestic public borrowing, FDI inflows, and remittances on financial development varies depending on public borrowing level and country specific characteristics regarding the related theoretical and empirical literature.

3.2. Econometric Methodology

In the econometric analysis, first pretests of cross-sectional dependence and heterogeneity were conducted for selection of unit root, cointegration, and causality tests. The Breusch and Pagan (1980) LM cross-sectional dependence test is used in case of T>N, Pesaran (2004) LM CD cross-sectional dependence test is used in case of T>N or T<N. The two tests yield biased results when the group average is zero, but individual average is different from zero. Pesaran et al. (2008) $LM_{adj.}$ test corrects the bias through adding variance and average to the test statistic. The presence of cross-sectional dependence was tested by these three tests. Then homogeneity of the slope coefficientts was tested by delta tilde and adjusted delta tilde tests of Pesaran and Yamagata (2008).

At the second stage of empirical analysis, the stationarity analysis of the series was examined by the CIPS (Cross-sectionally augmented IPS (Im- Pesaran-Shin (2003)) unit root test of Pesaran (2007) regarding the presence of cross-sectional dependence. Then, the cointegration relationship among domestic public borrowing, FDI inflows, remittances, and financial sector development was tested by Westerlund and Edgerton (2008) cointegration test with structural

breaks regarding the existence of cross-sectional dependence, heterogeneity and the crises in the study period.

The Westerlund and Edgerton (2008) cointegration test takes in consideration of both cross-sectional dependence and heterogeneity together with the structural break, heteroscedasticity, and autocorrelation. The statistic of cointegration test is figured out with use of the following equations:

$$y_{i,t} = \alpha_i + \eta_i t + \delta_i D_{i,t} + x'_{i,t}\beta_i + \left(D_{i,t}x_{i,t}\right)'\gamma_i + z_{i,t} \quad (2)$$
$$x_{i,t} = x_{i,t-1} + w_{i,t} \quad (3)$$

In the above equations, i=1,2,…,N shows the cross-sections, t=1,2,…,T shows the time dimension of the panel. D_{it} is the dummy variable and calculated as seen in Equation (4). Furthermore, α_i and β_i indicate constant and slope coefficients before the structural break, δ_i and γ_i indicate the change after the structural break. $w_{i,t}$ is the error term.

$$D_{i,t} = \begin{cases} 1, & t > T_i \\ 0, & Others \end{cases} \quad (4)$$

$z_{i,t}$ error term in Equation (2) is derived from the following equations which allow the cross-sectional dependence

$$z_{i,t} = \lambda'_i F_t + v_{i,t} \quad (5)$$
$$F_{j,t} = \rho_j F_{j,t-1} + u_{j,t} \quad (6)$$
$$\emptyset_i(L)\Delta v_{i,t} = \emptyset_i v_{i,t-1} + e_{i,t} \quad (7)$$

In the above equations F_t and $F_{j,t}$ (j=1,2,…,k), are the common vector with k dimension, λ_i is the compatible vector of factor loadings. F_t is stationary under the assumption of $\rho_j < 1$ for all j values. Therefore, Equation (2) is cointegrated under the condition of $\emptyset_i < 0$ (see Westerlund and Edgerton (2008) for further information about the test).

The cointegration coefficients are forecasted with AMG (Augmented Mean Group) estimator of Eberhardt and Teal (2010) taking notice of heterogeneity and cross-sectional dependence. The AMG estimator takes notice of the common factors and dynamic effects of the series, yields efficient results for the unbalanced panels, and may be employed in case of endogeneity problem (Eberhardt and Bond, 2009).

The Dumitrescu and Hurlin (2012) test is the improved version of Granger causality test for heterogeneous panels. The test considers heterogeneity and yields robust results in case of cross-sectional dependence. The test can be used in case of T>N or T<N and produces the efficient results or unbalanced panels (Dumitrescu and Hurlin, 2012). At the test, X and Y represents two stationary processes for N units during T period. Therefore, the following linear heterogeneous model is considered:

$$Y_{i,t} = \alpha_i + \sum_{k=1}^{K} \gamma_i^k Y_{i,t-k} + \sum_{k=1}^{K} \beta_i^k X_{i,t-k} + \varepsilon_{i,t} \quad (8)$$

In the Equation (8), K is optimal lag length. The null hypothesis of the test is that there is no causality from X to Y for all cross-sections. The null and alternative hypotheses derived from Equation (8) are as following:

$$\begin{aligned} H_0&: \beta_i = 0 \; \forall \, \mathrm{i} = 1,2,\dots,\mathrm{N} \\ H_1&: \beta_i = 0 \; \forall \, \mathrm{i} = 1,2,\dots,N_1 \\ &\quad \beta_i \neq 0 \; \forall \, \mathrm{i} = N_1 + 1,\dots,\mathrm{N} \end{aligned} \quad (9)$$

The null hypothesis asserts that there is no significant Granger causality among the series, but the alternative hypothesis asserts there is significant causality at least for one cross-section (see Dumitrescu and Hurlin (2012) for further information).

4. Empirical Analysis

In the applied section, first pretests of cross-sectional dependency and homogeneity are applied to specify the right unit root, cointegration and causality tests. Then, stationarity of the series is analyzed, and short and long run interactions among the variables are examined with panel cointegration and causality tests. The LM test by Breusch and Pagan (1980), LM CD by Pesaran (2004) and $LM_{adj.}$ test by Pesaran et al. (2008) are utilized to check the the existence of cross-section dependency, and the test results are reported in Table 3. The null hypothesis of cross-sectional independency is rejected at 1% significance level, and in turn presence of cross-section dependency among the series is revealed.

Table 3: Results of Cross-sectional Dependency Tests

Test	Statistic	p-value
LM	130.5	0.0000
LM adj*	15.73	0.0000
LM CD*	4.509	0.0000

*two-sided test

Moreover, by applying the adjusted delta tilde test of Pesaran and Yamagata (2008), the homogeneity of the cointegrating coefficients is investigated. The null hypothesis of homogeneity is rejected at 1% significance level, and in turn cointegrating coefficients are revealed to be heterogenous.

Table 4: Results of Homogeneity Tests

Test	Statistic	p-value
$\tilde{\Delta}$	6.563	0.000
$\tilde{\Delta}_{adj.}$	7.418	0.000

Due to the fact that there is cross-sectional dependence between the variables, the integration levels of the series is tested by the CIPS unit root test of Pesaran (2007). The test results are reported in Table 5, and FINDEV, PUBLIC, FDI, and REM are revealed to be I(1).

Table 5: CIPS Panel Unit Root Test Results

Variables	Constant	Constant + Trend
FINDEV	-0.085	-2.178
d(FINDEV)	-3.457***	-7.717***
PUBLIC	3.108	2.185
d(PUBLIC)	-3.684***	-2.639***
FDI	-0.819	-0.617
d(FDI)	-3.336***	-4.989***
REM	-0.863	0.636
d(REM)	-1.788**	-4.280***

Notes: *** and ** is respectively significant at 1% and 5% significance level

The cointegration relationship is questioned by Westerlund and Edgerton (2008) cointegration test considering the presence of cross-sectional dependency, heterogeneity and the crises in the study period. The cointegration test results are reported in Table 6. The test results of the version disregarding the structural breaks revealed no significant cointegration among the series. However, the test results of the version with level and regime shifts disclosed a significant cointegration among the series.

Table 6: Results of Westerlund and Edgerton (2008) Cointegration Test

Model	$Z_{\varphi}(N)$	P value	$Z_{\tau}(N)$	P value
No shift	0.989	0.839	-0.442	0.329
Level shift	-0.300	0.082	-1.683	0.046
Regime shift	-1.555	0.060	-4.314	0.000
Country	**Structural breaks (level shift)**		**Structural breaks (regime shift)**	
Bulgaria	2000		2000	
Croatia	2007		2007	
Czechia	2004		2004	
Estonia	1998		1998	
Hungary	2000		2000	
Latvia	1999		1999	
Lithuania	2005		1998	
Poland	2001		2003	
Romania	2004		1999	
Slovakia	2000		2000	
Slovenia	2000		2000	

Taking into account of cross-sectional dependency and the heterogeneity, the long run coefficients are estimated by Augmented Mean Group Estimator (AMG) estimator of Eberhardt and Bond (2009), and the test results are reported in Table 7. The test results showed that the variables of domestic public borrowing, FDI inflows, and remittances do not have significant influence on financial development in overall panel.

However, individual long run coefficients revealed that domestic public borrowing (PUBLIC) positively affected financial sector development in Bulgaria, Croatia, Lithuania, and Romania, but negatively affected financial sector development in Slovak Republic and Slovenia.

On the other side FDI inflows positively affected financial sector development in Croatia, Estonia, Romania. Lastly, remittances positively affected financial sector development in Croatia, Lithuania, Romania, Slovak Republic, but negatively affected financial sector development in Slovenia.

Table 7: Long Run Cointegrating Coefficients

Country	PUBLIC	FDI	REM
Bulgaria	0.0056123***	-0.000392	-0.0003664
Croatia	0.0039171***	0.0072137***	0.0286034***
Czech Republic	-0.0012541	0.0002858	0.0123795
Estonia	-0.0004306	0.0028967*	-0.0334825
Hungary	-0.0033664	-0.0004097	-0.0117242
Latvia	-0.0063594	-0.0066806	0.0015701
Lithuania	0.0042283***	0.0006331	0.0126823**
Poland	-0.0009157	-0.0068405	-0.0185286
Romania	0.0030746**	0.0051232*	0.0272693***
Slovak Republic	-0.00133*	-0.0012332	0.0301057***
Slovenia	-0.0095112***	0.0018114	-0.1715901***
Panel	-0.0005759	-0.0007126	-0.0111892

Notes: ***, **, and * is respectively significant at 1%, 5%, and 10%

The influence of domestic public borrowing on financial development can be varied depending on public borrowing level and country specific characteristics. Furthermore, two opposite views called as lazy bank view and safe asset view have been suggested on the influence of public borrowing on financial sector development. The findings for Bulgaria, Croatia, Lithuania, and Romania supported safe asset view, but the findings for Slovak Republic and Slovenia supported lazy bank view. However, the magnitude of the impact was found to be very low mainly resulted from low level of public borrowing by the countries in the sample. Our findings for Bulgaria, Lithuania, Romania, Slovak Republic, and Slovenia compromised with Hauner (2009) using a threshold regression analysis from the relevant empirical literature, because a positive impact of public borrowing on financial development was seen in the countries with lower public borrowing (7.73% of GDP in Bulgaria, 11.78% of GDP in Lithuania, 8.02% of GDP in Romania) than 11.81% GDP of average panel public borrowing. On the other side, negative effect of public borrowing on financial development was seen in the countries with higher public borrowing (16.36% of GDP in

Slovak Republic, and 12.46% of GDP in Slovenia) than average panel public borrowing. However, a positive impact of public borrowing on financial development in Croatia with a higher public borrowing (18.58% of GDP) than the average panel public borrowing can be resulted from country specific features. However, our findings contradicted with the findings reached by Ilgün (2016) and Altayligil and Akkay (2013) conducting studies for emerging economies. We evaluate that the contradiction can stem from the EU transition economies' public borrowing level already is very lower than many countries in the world. The other empirical studies have generally focused on crowding out effect of domestic public borrowing on private credits by banks. Therefore, it is not meaningful to compare our findings with the aforementioned studies. On the other side, a positive influence of FDI inflows and remittances on financial sector development was expected, because the countries began to attract FDI inflows and experience the inflows remittances especially with the contribution of EU membership and it has been discovered in keeping with the general trend in the related empirical literature.

The causality interaction among the variables has been tested by the causality test developed by Dumitrescu and Hurlin (2012), and the test results are reported in Table 8. According to the results of the causality test, one-way causality from both domestic borrowing to the development of the financial sector has been identified. So, the domestic public borrowing has a significant influence on financial sector development in compatible with the relevant theoretical considerations.

Table 8: Results of causality test

Null Hypothesis	W-Stat.	Zbar-Stat.	Prob.
DPUBLIC ↛DFINDEV	**5.70842**	**4.05453**	**5.E-05**
DFINDEV ↛ DPUBLIC	2.72786	0.47395	0.6355
DFDI ↛ DFINDEV	3.39226	1.27210	0.2033
DFINDEV ↛DFDI	3.39435	1.27462	0.2024
DREM ↛DFINDEV	2.39706	0.07656	0.9390
DFINDEV ↛DREM	3.67631	1.61333	0.1067

5. Conclusion

Financial sector development has many economic implications for the economies such as raising economic growth and entrepreneurial activity, poverty alleviation and improvements in

income inequality. In this context, this paper researches the effect of domestic public borrowing together with FDI inflows and remittances on the development of financial sector for the period 1996-2017 in 11 EU transition economies experiencing a structural transformation with Westerlund and Edgerton (2008) cointegration test with structural breaks and Dumitrescu and Hurlin (2012) panel causality regarding the gap in the related literature.

The panel causality analysis disclosed that domestic public borrowing has a significant impact on financial sector development, but no causality interactions among financial development, FDI inflows, and remittances were revealed. On the other side, the long run econometric analysis through cointegration test has revealed that domestic public borrowing positively affected financial sector development in Bulgaria, Croatia, Lithuania, and Romania, but negatively affected financial sector development in Slovak Republic and Slovenia. On the other side FDI inflows positively affected financial sector development in Croatia, Estonia, Romania. Lastly, remittances positively affected financial sector development in Croatia, Lithuania, Romania, Slovak Republic, but negatively affected financial sector development in Slovenia.

Our findings on the influence of domestic public borrowing on financial sector development partially compromised with the theoretical expectations, because a positive (negative) impact of public borrowing on financial development was seen in the countries with lower (higher) public borrowing level than the panel average public borrowing. Furthermore, the average public borrowing of EU transition countries is lower than many countries in the world. The theoretical considerations, our findings, relevant empirical literature reveal that a dominant share of public sector in debt markets mainly prevents the development of financial sector and in turn debar the countries from the positive implications of financial development. Therefore, the countries should avoid the emergence of a financial system heavily dependent on the public sector.

Furthermore, a positive weak influence of FDI inflows and remittances on financial sector development consistent with the relevant literature, because the countries experienced a significant institutional and economic transformation with the help of EU membership negotiations. Future studies can be conducted about the impact of institutions and regulatory framework on the interactions between domestic public borrowing and financial sector development.

Acknowledgement

This study has been derived from the ongoing Ph.D. thesis entitled “Impact of Domestic Public Borrowing on Financial Development: Evidence from European Union Transition Economies” of

Emre Sakar under the advisory of Prof. Yilmaz Bayar in Usak University, Graduate Education Institute, Department of Economics.

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