Has European Financial Integration Promoted Economic Growth Among the New European Union Countries?

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Abstract

This study examines whether the European Monetary Union (EMU) has accelerated economic growth among Central and Eastern European Countries (CEEC) during 1997–2012. The larger stock market size slightly boosted growth before EMU membership. This is due to the anticipated positive effect of stock market expansion. Second, the higher bank credit flows have slowed growth since EMU membership. The reason is that the CEEC have become overly dependent on the European Union (EU) bank capital. The results suggest that CEECs have to implement much deeper stock market and banking reforms to boost their long-term growth.

JEL Codes: F15; F36; O40; O11
Keywords: economic integration; financial market integration; economic growth; economic development

1. Introduction

Thirteen Central and Eastern European countries (CEEC) officially became European Union (EU) members in 2004. Seven of them joined the European Monetary Union (EMU) between 2008 and 2015, whereas the rest have been in negotiations with the eurozone countries to follow suit. After joining the EU, CEEC stock markets have become more integrated with the stock markets in western EU countries (Horvath and Petrovski, 2013). Their stock market sizes have substantially increased because of privatization and the entry of foreign investors. In particular, the surge in their stock market activities has been facilitated by higher investments by German and US investors (Syllignakis and Kouretas, 2010). The higher stock market development has boosted CEEC economic growth. Moreover, their banking sectors have attracted huge EU investments on the back of deeper liberalization since the early 1990s. Major banking reforms have improved banking supervision in the CEECs and enhanced access to global capital flows (Caporale et al., 2015). The greater foreign bank presence would provide a larger pool of capital to fund productive projects, which yield positive externalities and scale advantages (Herwartz and Walle, 2014). The development of the banks has also accelerated growth.

The objective of this study is to examine whether CEEC financial development has contributed to their economic growth during 1997–2012. The stock market sizes have further expanded due to their integration with EU stock markets. This then facilitates better access to a larger pool of capital in the more developed stock markets; hence, financing more productive investment projects, and therefore, promoting economic growth. Moreover, the bank credit supply has substantially increased because of huge EU bank FDI inflows. The greater foreign bank presence provides more capital to finance larger projects, which also contributes to economic growth. Moreover, this study compares the growth effects of developments in stock markets and banks before and after joining the EMU. Another objective is to investigate whether foreign direct investment (FDI) inflows into the CEEC have accelerated economic growth. EU financial integration ultimately achieving political integration would lead to more growth-enhancing FDI as investors expect a major improvement in both political and economic institutions in the CEEC. The magnitude of the FDI effect may vary among these countries depending on how open they are in terms of trade. They can achieve higher growth if the FDI inflows are followed by a reduction in trade barriers and barriers to new firm entry and exits (Herzer, 2012). FDI interacting with higher trade flows would further promote growth. Moreover, FDI would promote growth only for countries with a minimum level of human capital. The more skilled and educated the labour force, the better it can be exploited and benefit from FDI spillovers (Kottaridi and Stengos, 2010), and this would also boost growth.

The overall results provide crucial suggestions on how to boost long-term growth. Despite joining the EMU, the CEEC stock markets and banking sectors have remained underdeveloped in terms of financial depth. Deeper stock market reforms should be implemented to establish a proper institutional and corporate governance framework. Better market regulatory and supervisory mechanisms would increase their appeal to eurozone stock markets. Moreover, the banking sectors should develop better regulatory frameworks to improve banking supervision and access to global banking capital.

This study contributes to the literature in two respects. First, this is the first study to investigate the effect of CEEC financial development on economic growth. CEEC stock

markets and banking sectors have undergone major transformation since the 1990s. EU and EMU membership have substantially accelerated their stock market and bank development. There have been numerous regulatory changes in their financial markets to achieve harmonization so that they can build a single and competitive market for financial services (Georgantopoulos et al., 2015). In particular, adopting the euro has facilitated the integration of the CEEC stock markets and banks with those of the western EU countries. More efficient stock markets and banking systems would boost CEEC economic growth in the long run. The results provide valuable insights into the degree of financial market integration since joining the EMU. This suggests the future direction of the development of their stock market and banking sectors so that they can catch up with the EU level. This study contributes to the literature on the effect of CEEC financial development on economic growth. Second, this is the first study to examine the FDI effect on economic growth. FDI definitely has boosted growth in developed countries. However, the FDI effect in developing countries depends on its interaction with other factors. The FDI effect on CEEC growth hinges on the quality of their institutional environment. FDI inflows would promote growth if the CEEC had better human capital and greater trade openness. A more educated labour force would promote long-term growth as they can better adapt to the latest technologies. Greater trade openness in terms of imports and exports can lead to higher growth, as it would increase access to larger foreign markets. The results would indicate whether FDI interacted with human capital and trade openness would boost growth. This study contributes to the literature on the effect on growth of FDI interaction with human capital and trade flows.

The remainder of the paper is organized as follows. Section 2 presents the literature review on economic growth. Section 3 describes the empirical specifications. Section 4 presents the results and discusses their significance. Section 5 describes their implications for long-term policies to promote CEEC economic growth. Section 6 concludes.

2. Literature Review

A growing number of empirical studies have examined the effect of financial development on economic growth. First, the positive stock market effect on growth depends on the level of stock market capitalization. The CEEC stock markets have substantially expanded because of the privatization process. But the level of stock market capitalization has varied widely among these individual countries. Hence, the greater stock market capitalization has had a positive but minor effect on their economic growth. However, their stock markets have remained underdeveloped in terms of financial depth (Caporale et al., 2015).

Second, the positive stock market effect on growth depends on the level of economic development. The higher stock market capitalization has no impact on growth during the early years of transition. The lack of major stock market reforms such as the proper institutional and corporate governance framework has diminished the benefit of stock market effect on growth (Fink, Haissa, and Vuksic, 2009).

Third, the positive stock market effect on growth depends on the level of financial development. The higher stock market liquidity would only have the largest positive effect on growth when the stock markets have at least intermediate level of financial development. The countries with underdeveloped stock markets would not achieve higher growth (Rioja and Valev, 2004).

Finally, the higher stock market liquidity would contribute to the higher growth than the stock market size. The more liquid stock markets would provide firms with greater access to permanent capitals which can be used in financing larger productive projects (Rousseau and Wachtel, 2000).

Greater bank development through such factors as increases in bank credit may not boost economic growth. The positive effect of the banks on growth depends on the growth of private credit relative to real output growth. The effect is negative if rapid private credit growth is not accompanied by real output growth. Financial services compete with other sectors for inputs such as skilled workers. Therefore, an expansion of the financial market that is unaccompanied by technological advances in the productive sectors may divert resources from the rest of the economy to financial sectors, which would result in lower economic growth (Ductor and Grechyna, 2015). Furthermore, bank credit has a negative effect on growth among non-eurozone countries. Their banking infrastructures still remain too underdeveloped to enhance their impact on growth. Their banking regulations and credit allocation process requires further improvement to accelerate growth (Georgantopoulos et al., 2015). Finally, higher bank credits may not be conducive for growth. As economies become more developed, credit markets become less important for economic development. Market-based financial intermediation, such as via stock markets, becomes more important in providing the major financing for productive projects (Arcand et al., 2015; Rioja and Valev, 2004).

The relevant literature has examined whether FDI promotes economic growth, since it can contribute to higher growth than domestic investment (Borensztein et al., 1998; Neto and Veiga, 2013). In particular, FDI can result in productivity spillovers through technology and know-how transfers to local industry. But this effect would only appear if the local firms are willing to invest in absorbing foreign technologies and skills (Mencinger, 2003). Furthermore, deeper financial integration further promotes FDI inflows into developing countries. Political integration causes investors to be more optimistic about future reforms, institutional improvements, and the implementation of sound economic policy. This leads to more growth-enhancing FDI although their current institutional frameworks are still not fully developed (Friedrich et al., 2013). In addition, the FDI effect can have either a positive or negative effect on growth in developing countries. The exact effect is determined by the country characteristics such as openness to trade. FDI liberalization does not facilitate higher growth unless it is followed by substantial trade liberalization such as the elimination of trade barriers and barriers to new firm entry and exit. Developing countries can maximize the benefits of FDI by implementing major economic reforms; thereby, increasing their appeal to sources of FDI inflows. These reforms include the improvement of resource allocation by eliminating market-distorting polices. They can also limit government intervention through reducing the regulatory burden on business (Herzer, 2012). Finally, FDI can accelerate growth through promoting exports in developing countries. In particular, FDI in export-oriented industries can help restructure the production process. The local firms benefit from higher productivity through improvements in production and management procedures (Cuaresma and Worz, 2005). This boosts their export competitiveness and facilitates their export reorientation toward developed countries, especially EU countries (Sohinger, 2005).

In general, openness to FDI contributes to higher growth than openness to trade flows. Due to the convergence effect, developing countries more open to FDI and trade should not expect a permanent improvement in their growth rates. There is only transitory growth,

which slows down as economies reach their steady state. Nonetheless, investment and trade liberalization allows these countries to narrow their development gap with developed countries over the long run (Cieslik and Tarsalewska, 2011).

3. Econometric Specification

3.1. Analytical Framework

This study develops an empirical model to analyse the impact of EU financial integration and FDI on CEEC economic growth through 1997–2012. The basic model follows the gravity equation first developed by Linnemann (1966), which states that bilateral trade flows are directly proportional to the product of the trading countries' gross domestic product (GDP) and inversely proportional to the distance between them. This study modifies the gravity model to incorporate financial market development and FDI variables to measure their effects on CEEC growth. First, higher stock market development promotes growth. Due to the major privatization process since joining the EMU, CEEC stock markets have become more integrated with EU stock markets. The stock market sizes have substantially increased as they have implemented stock market reforms since opening up to foreign investors. The intermediate level of financial development in these countries has facilitated the effect of the size of the stock market on their economic growth (Rioja and Valev, 2004). To assess the stock market size effect, the modified model includes the ratio of stock market capitalization to GDP (*SktCap*), which measures the stock market size to the domestic economy. *StkCap* is the total value of stocks listed on the domestic market divided by CEEC GDP. The larger stock market sizes allow the CEECs to obtain more capital to finance larger productive projects and promote economic growth. Second, bank development boosts growth. The EMU has deepened CEEC bank liberalization through a surge in EU bank FDI. EU mergers and acquisitions of CEEC banks have helped consolidate their market shares. Moreover, bank liberalization has led to the privatization of more local state-owned banks. The increased bank competition has boosted the bank credit effect on their economic growth. To assess the bank credit effect, the modified model includes the ratio of bank credits to CEEC GDP (*BankCred*) to measure bank efficiency. The increase in bank credit flows being allocated for productive investments such as technological advances promotes growth in the long run (Ductor and Grechyna, 2015).

Third, FDI inflows promote growth through technology and know-how transfers. They contribute more to higher growth than domestic investments (Borensztein et al., 1998; Neto and Veiga, 2013). The most important benefits of EU FDI include technology and management skill transfers to CEEC. Local firms incorporated new technologies and skills to improve their production efficiency and product quality. Moreover, deeper EU financial integration has attracted more EU FDI inflows, as foreign investors expected major reforms, institutional improvements, and the implementation of sound economic policy in these countries. This has led to more growth-enhancing FDI inflows despite the weak institutional frameworks (Friedrich et al., 2013). To assess the FDI effect, the modified model includes FDI inflows into CEEC divided by CEEC GDP (*FDI*) to measure the FDI growth-enhancing effect.

Fourth, the FDI interacted with greater stock market development accelerating growth. Since joining the EMU, CEEC stock markets have become more integrated with EU stock

markets. Greater stock market efficiency has increased the demand for external finance, and therefore, expanded the stock markets (Guiso et al., 2004). Foreign investors have gained better access to the increasing supply of capital in the larger stock markets, which in turn has boosted more FDI inflows. EMU membership has intensified FDI and the stock market size effect on growth. To analyse the FDI-stock market size effect, the modified model includes an FDI-stock market capitalization interaction variable (*FDI*StkCap*) to measure the FDI and stock market size effect on growth. Similarly, FDI interacted with the bank development promoting growth. Deeper bank liberalization facilitated by the EMU has resulted in more EU bank mergers and acquisitions of CEEC banks. Meanwhile, more local state-owned banks have become privatized due to growing EU bank FDI inflows. The rise in bank competition has substantially increased bank credit supply. Foreign investors have obtained lower-cost bank credits, which has stimulated more FDI inflows (Koetter and Wedow, 2010). The EMU has boosted the FDI and bank credit effect on growth. To assess the FDI-bank credit effect, the modified model includes an FDI-bank credit interaction variable (*FDI*BankCred*) to measure the FDI and bank credit effect on growth.

Fifth, FDI interacted with greater trade openness boosting growth. Trade openness can be measured according to the volume of trade flows (*Trade*) and proportion of high-technology exports (*HitechExp*). Trade refers to the sum of exports and imports of goods and services measured as a share of CEEC GDP. Even before joining the EMU, CEECs have pursued deeper trade and FDI liberalization. Trade liberalization through free trade agreements has substantially expanded CEEC access to all EU markets. Therefore, FDI liberalization through the reduction of barriers to new firm entry has attracted more FDI. This in turn has triggered technology and know-how transfer as local firms have invested in absorbing foreign technologies and skills (Mencinger, 2003). They have improved production efficiency and product quality. To assess the FDI-trade flow effect, the modified model includes an FDI-trade flow interaction variable (*FDI*Trade*) to measure the FDI and trade flow effects on growth. Moreover, FDI interacted with the greater proportion of high-technology exports accelerating growth. The proportion of high-technology exports (*HitechExp*) refers to the total amount of high-technology exports measured as a share of CEEC GDP. Local firms have further boosted their export competitiveness by incorporating the technological content of imports into their products (Herzer, 2012). This has allowed them to shift their major export markets toward high-income countries such as the EU countries (Sohinger, 2005). To assess the FDI-high-technology export proportion effect, the modified model includes an FDI-high-technology export proportion interaction variable (*FDI*HitechExp*) to measure the FDI and high-technology export effects on growth.

Finally, FDI interacted with the better human capital promoting growth. The human capital variable (*School*) refers to the proportion of the labour force that has secondary school education as a percentage of the total CEEC labour force. FDI inflows have boosted growth as the CEEC have relatively more educated labour force to learn foreign technologies (Ford et al., 2008). Given the better technologies and labour quality, foreign firms have increased their productivity and upgraded their product quality. To assess the FDI-labour quality effect, the modified model includes an FDI-labour education interaction variable (*FDI*School*) to measure the FDI and labour education effects on growth.

3.2. Estimation Model

The modified gravity model examines the financial development and FDI effects on CEEC economic growth through 1997–2012. The regression equation, which incorporates the financial market development and FDI variables is given as:

$$\log(GDPGrowth_{it}) = \alpha + \beta_1 \log(DomInv_{it}) + \beta_2 \log(School_{it}) + \beta_3 \log(GovExp_{it}) + \beta_4 \log(FDI_{it}) + \beta_5 \log(StkCap_{it}) + \beta_6 \log(BankCred_{it}) + \beta_7 \log(TrdOpen_{it}) + \beta_8 \log(RDBus_{it}) + \beta_9 \log(RDGov_{it}) + \varepsilon_{it} \quad (1)$$

where $GDPGrowth_{it}$ is the growth of real GDP per capita of CEEC i at year t (1997–2012). All variables are measured in US dollars adjusted for inflation to the base year 2005. The CEECs include Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia. All of them joined the EU in 2004. Among them, Cyprus, Estonia, Latvia, Lithuania, Malta, Slovakia and Slovenia adopted the euro between 2008 and 2015. Their EU membership facilitated the integration of their financial market with those of western EU countries. Their subsequent EMU membership has further deepened their stock market and bank integration. As the eurozone and non-eurozone CEECs have developed very close economic ties, the EMU strengthens their financial market integration with EU countries. Hence, this study includes both country samples in order to obtain a more accurate estimation.

The main explanatory variables are the stock market and bank development variables (*StkCap* and *BankCred)*. The stock market capitalization variable (*StkCap*) is the total value of stocks listed on the domestic market divided by the CEEC GDP. This measures stock market size relative to the economy. A larger value for *StkCap* indicates a large country with a larger stock market. A country with a well-developed stock market has a larger stock market relative to the size of its economy (Beck and Levine, 2002). The CEEC stock markets have further expanded because of the privatization and the entry of foreign investors. The stock market capitalization has considerably increased due to greater foreign participation in stock market activities (Syllignakis and Kouretas, 2010). More integrated stock markets facilitate access to a larger pool of capital via the EU stock markets. The CEEC can finance larger productive projects to promote their economic growth. For the bank variable, *BankCred* is the total amount of bank credits provided by deposit money from banks to the private sector divided by CEEC GDP. A large value for *BankCred* indicates a higher level of financial services, which suggests greater bank development (Levine et al., 2000). The major bank reforms since the 1990s have resulted in more competitive and efficient CEEC banking markets. Due to EU mergers and acquisitions, the large-scale bank privatization activities have substantially increased bank efficiency (Bonin et al., 2005). The larger banks provide more bank credits to finance more productive projects, which can boost their growth.

Another major explanatory variable is foreign direct investment inflows into the CEEC (*FDI*). This is equal to FDI divided by CEEC GDP. The FDI benefits local manufacturing industries through technology and management skill transfers. Local firms can reap the benefits of the positive externalities of FDI. This can significantly raise their overall productivity. If these industries are export-oriented, FDI can further increase their export competitiveness (Sohinger, 2005). FDI inflows contribute to long-term economic growth.

The other explanatory variables of interest are the trade openness variable (*TrdOpen*) that refers to either *Trade or HitechExp*. Trade is equal to the sum of exports and imports of goods and services measured as a share of CEEC GDP. Larger trade flows would increase macroeconomic efficiency by providing access to new raw materials, low-cost intermediate goods, larger markets and the latest technologies (Herwartz and Walle, 2014). This would benefit local firms as they can improve production efficiency and increase exports to larger markets. Large trade flows contribute to growth. *HitechExp* is equal to the total amount of high-technology exports measured as a share of CEEC GDP. Given the high level of research and development (R&D) intensity, the high-technology export proportion variable (*HitechExp*) has a larger effect on long-term growth. The main positive externalities are derived from knowledge spillovers and economies of scale (Sheridan, 2014). The local firms can learn the high technological content of imports and incorporate them into their exports to boost their long-term growth. Moreover, the other technology-related explanatory variables are *RDBus* and *RDGov. RDBus* refers to the amount of business enterprise R&D spending measured as a share of CEEC GDP. RDGov refers to the amount of government R&D spending measured as a share of CEEC GDP. Both variables can measure the level of innovative activities. The business R&D spending can complement government R&D spending in CEECs, as they have different shares in their total R&D spending. A high share of government R&D spending can partly compensate for low shares of business R&D spending (Silaghi et al., 2014). Higher business R&D spending can directly contribute to growth as it is allocated to research on commercial products. In comparison, government R&D spending is allocated to research in basic scientific research not conducive to growth over the short run. Nonetheless, such basic research can improve the overall quality of business innovative activities in the long run and can promote long-term CEEC growth.

The three control variables are the common determinants of CEEC growth. The domestic investment variable (*DomInv*) refers to the gross capital formation as a share of CEEC GDP. It includes the expenditures on additions to fixed assets of the economy and net changes in inventory level as a share of GDP. Domestic investment would boost growth in countries with high institutional quality (Dort et al., 2014). The human capital variable (*School*) is the proportion of the labour force that has a secondary school education as a percentage of the total labour force. Secondary school enrolment is used because there are complete data available for all of the sample countries. Other human capital indicators such as education expenditure and educational attainment have sizeable gaps in the data before 2005. Previous studies indicate that higher educational attainment would be highly beneficial for R&D activities (Sterlacchini, 2008). The emphasis on these activities would contribute to sustainable higher economic growth. Finally, the government spending variable (*GovExp*) measures total government expenditures as a share of CEEC GDP. It includes both the current and capital development expenditures and excludes lending minus repayment. The improvement in infrastructures for trade would facilitate trade flows. Similarly, the better infrastructures would attract more FDI inflows. Hence, more government expenditures would boost long-term growth.

Another major concern of this study is to analyse whether the FDI interaction with financial market development would contribute to CEEC economic growth since joining the EMU. The modified gravity model includes the FDI-stock market and FDI-bank interaction variables to measure FDI-financial market interaction effects on growth. The new regression equation modifying equation (1) by including these interaction variables is given as:

$$\log(GDPGrowthit) = \alpha + \beta_1 \log(DomInv_{it}) + \beta_2 \log(School_{it}) + \beta_3 \log(GovExp_{it}) + \beta_4 \log(TrdOpen_{it}) + \beta_5 \log(RDBus_{it}) + \beta_6 \log(RDGov_{it}) + \beta_7 \log(FDI_{it}{}^{*}StkCap_{it}) + \beta_8 \log(FDI_{it}{}^{*}BankCred_{it}) + \varepsilon_{it} \quad (2)$$

The dependent and independent variables are already explained for equation (1). The two new variables are the FDI-stock market ($FDI_{it}{}^{*}StkCap$) and FDI-bank interaction variables ($FDI_{it}{}^{*}BankCred$). As mentioned earlier, FDI interacting with stock market capitalization ($FDI_{it}{}^{*}BankCred$) would accelerate growth. The higher stock market efficiency due to stock market integration has increased the demand for external finance, and therefore, expanded the size of the stock market (Guiso et al., 2004). Foreign investors have gained better access to the larger pool of capital in the stock markets, which has boosted FDI inflows. FDI-stock market size interaction has boosted growth. Similarly, FDI interacting with bank credit flows ($FDI_{it}{}^{*}BankCred$) would promote growth. The banking sectors have become more competitive because of EU mergers and acquisitions of local banks. The larger banks have provided more bank credit to the private sectors. This has reduced the financial intermediation cost for foreign investors to obtain bank credit, which has attracted more FDI inflows (Koetter and Wedow, 2010). The FDI-bank credit interaction has promoted growth.

The final important issue of this study is to analyse whether FDI interacting with trade openness and human capital would promote CEEC growth. The modified gravity model includes FDI-trade openness and FDI-labour education variables to measure their effects on growth. The new regression equation modifying equation (1) by including these interaction variables is given as:

$$\log(GDPGrowthit) = \alpha + \beta_1 \log(DomInv_{it}) + \beta_2 \log(GovExp_{it}) + \beta_3 \log(StkCap_{it}) + \beta_4 \log(BankCred_{it}) + \beta_5 \log(RDBus_{it}) + \beta_6 \log(RDGov_{it}) + \beta_7 \log(FDI_{it}{}^{*}TrdOpen_{it}) + \beta_8 \log(FDI_{it}{}^{*}School_{it}) + \varepsilon_{it} \quad (3)$$

The dependent and independent variables are already explained for equation (1). The two new variables are the FDI-trade openness (*FDI*TrdOpen*) and FDI-labour education (*FDI*School*) variables. First, FDI interacting with trade flows (FDI*Trade) would boost growth. Before joining the EMU, CEECs have pursued deeper trade and FDI liberalization. The trade liberalization facilitated by the free trade agreements has substantially expanded access to the entire EU markets. Therefore, FDI liberalization through the reduction of barriers to new firm entry has attracted more productive FDI. The FDI has brought about technology and know-how transfers to improve production efficiency and product quality. The FDI-trade flow interaction has accelerated growth. Second, FDI interacting with high-technology export proportion (*FDI*HitechExp*) would accelerate growth. In addition to FDI inflows, local firms have improved their export competitiveness by incorporating the technological content of imports into their products (Herzer, 2012). This has allowed them to increase high-technology exports to high-income countries such as EU countries (Sohinger, 2005). The FDI-high-technology export interaction has promoted growth. Finally, FDI interacting with labour education (*FDI*School*) would promote growth. Through FDI inflows, the more educated labour force has better adapted foreign technologies (Ford et al., 2008). Given these advantages, foreign firms have boosted their production and product competitiveness. FDI-labour education interaction has accelerated growth.

3.3. Two-Stage Least Squares and Generalized Method of Moments Estimations

An endogeneity problem may exist in the financial development and FDI variables. It is possible that both the development of the CEEC financial market and FDI inflows increase with higher economic growth. Greater financial market development promotes economic growth through a surge in external financing. Greater growth increases the demand for financial services, which in turn further accelerates financial market development. Similarly, FDI inflows can promote economic growth due to their positive externalities. But countries with higher growth can attract more FDI inflows, as they are considered to be more profitable by investors. To address the endogeneity problem, this study used the two-stage least squares (2SLS) method to re-estimate the endogenous variables (*StkCap, BankCred*, and *FDI*). The instrumental variables (IV) replace these endogenous variables. First, the IV for *StkCap* includes *CapForm* and *StkTrade*. *CapForm* is the gross capital formation as a percentage of CEEC GDP. It measures the potential demand for financial services among CEEC companies. *StkTrade* measures the total value of stocks being traded on the domestic market divided by CEEC GDP. It reflects stock market liquidity relative to the size of the economy.[1] Second, the IV for *BankCred* includes *PrivCred* and Saving. *PrivCred* equals the credit value provided by financial intermediaries to the private sector divided by CEEC GDP. It measures total credits issued to the private sectors, but excludes credits issued to governments and public agencies. Saving is the amount of GDP minus the final consumption expenditure. This refers to the amount of domestic saving available for bank credit and private credit flows.[2] Finally, the IV for *FDI* includes *GDP* and *Inflat*. *GDP* is the gross domestic product of the CEEC. *Inflat* is the annual growth rate of the GDP implicit deflator. This shows the rate of price changes in the CEEC. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.[3] In addition to the 2SLS method, equations (1) to (3) are also re-estimated using the dynamic generalized method of moments (GMM) to control for biases related to endogeneity, omitted variables, and unobserved country fixed effects. This can also address the heteroskedasticity and serial correlation problems. The first difference procedure is chosen as the transformation method to remove cross-section fixed effects. The stock market and bank IV used in the 2SLS method are included as the IV in the dynamic GMM method.

Almost all the data on the explanatory variables including the IV are obtained from the World Bank database. While the data on FDI are obtained from the World Bank database, the data on FDI are drawn from the International Monetary Fund's *International Financial Statistics*.

[1] The Wald test is used to determine whether these IV are appropriate. The results that show the large F-statistic value confirm their suitability for StkCap. The results are available upon request.

[2] The Wald test is used to determine whether these IV are appropriate. The results that show the large F-statistic value confirm their suitability for BankCred. The results are available upon request.

[3] The Wald test is used to determine whether these IV are appropriate. The results that show the large F-statistic value confirm their suitability for FDI. The results are available upon request.

4. Estimation Results

4.1. Financial Development Effects on Economic Growth

The main focus of this study is whether greater financial market development has boosted CEEC economic growth through 1997–2012. Specifically, it investigates whether the development of the stock market and banks have accelerated after joining the EU and EMU since 2004 and 2008, respectively. Table 1 presents the 2SLS and GMM results for equation (1) including *Trade* as the trade openness variable, while Table 2 presents those results including *HitechExp* as the trade openness variable. As seen in both Tables, the estimations yield inconclusive results over the stock market size effect on growth. In contrast to the insignificant 2SLS results, the GMM coefficients on *StkCap* are only marginally significant and positive through 1997–2004. This indicates that larger stock market size has only boosted growth before EU membership in 2004. This is due to the anticipated positive effect of the stock market expansion. The most surprising result is the lack of the effect of stock market size on growth since EMU membership. The 2SLS and GMM coefficients on *StkCap* are positive but not statistically significant through 2005–2012. There are two reasons for this. First, compared to the EU stock markets, CEEC stock markets have remained relatively underdeveloped in terms of financial depth. The stock market expansion has primarily relied on privatization and the entry of foreign investors (Caporale et al., 2015). Most of the stock markets have remained small. The stock market reforms have been implemented without the proper institutional and corporate governance frameworks (Fink, Haissa, and Vuksic, 2009). As most of the stock markets have failed to further boost their liquidity and size, this has diminished the stock market effect on growth despite EMU membership. Second, the timing of their EMU membership has coincided with the occurrence of the financial crisis. The US financial crisis since 2008 has substantially slowed CEEC stock market activities. Due to the impact of the financial crisis, investors in the over borrowed speculative hedge funds, private equity, and other institutional investors have withdrawn almost all their investments from the emerging markets including the CEEC stock markets. As a result, these stock markets have lost over half of their value during the second half of 2008. This has impeded CEEC stock market integration with EU countries. Hence, CEEC stock markets have only partially integrated with those of the EU countries (Syllignakis and Kouretas, 2010). This may explain the lack of stock market size effect on growth through 2005–2012.

The results suggest that bank credit flows have the opposite effect on growth. As reported in Tables 1 and 2, the 2SLS and GMM coefficients on *BankCred* are negative and statistically significant for the entire period 1997–2012. The sub-period results show that the magnitude of the coefficients has further increased through 2005–2012. This confirms that the higher bank credit flows have decreased rather than increased growth since EMU membership. The overall results contradict the argument that the increased supply of bank capital is conducive to higher growth as they can finance more productive investments. The negative bank credit effect can be explained by the dominance of EU banks in the CEEC banking sectors. Since the 1990s, substantial bank liberalization has led to rapid bank expansion as local state-owned banks have become privatized. Therefore, the EU banks have engaged in mergers and acquisitions of the local banks. The EU banks have taken control of the majority of the assets and capital flows in the financial markets. This has strengthened CEEC dependence on EU bank capital supply (Caporale et al., 2015). However, the increase in bank credits might not be

used for productive investments due to EU bank dominance. The bank credits used for speculative investments might divert valuable resources from the productive sectors of the economies. Hence, the increase in bank credit has diminished their growth (Ductor and Grechyna, 2015). More surprisingly, the results indicate that the negative bank credit effect has further increased since EMU membership. This is attributed to the lack of effective banking regulations to better manage the massive bank FDI inflows. The lack of effective anti-trust regulations and supervisions over foreign mergers and acquisitions has led to excessive EU bank concentration (Georgantopoulos et al., 2015). The majority of newly privatized banks have been acquired by EU banks after their banking sectors have further opened up since EMU membership. This has severely limited bank competition. More importantly, this has worsened the credit allocation process. Local firms have difficulty obtaining the growing bank capital to finance productive investment projects. Besides, the overreliance on EU bank credit supply would make the CEEC growth more volatile. The eurozone debt crisis since 2010 has led to major declines in EU bank credit in the CEEC. This can explain why the higher bank credit flows have led to lower growth since joining the EMU.

4.2. The FDI Interaction Effects on Economic Growth

Another important issue involves examining whether FDI interacting with higher financial development boosted CEEC economic growth. The results in Tables 3 and 4 indicate a weak FDI-stock market size interaction effect on growth. In contrast to the insignificant GMM coefficients, the 2SLS coefficients on *FDI*StkCap* are positive and statistically significant over the entire period. But the size of the coefficient is quite small. The sub-period results show that the coefficients are not significant through 1997–2004 and 2005–2012. This suggests that FDI-stock market size interaction has resulted in a small increase in growth despite EMU membership. There are two reasons for this. First, individual CEECs have different levels of stock market integration with EU stock markets. Only three non-eurozone CEECs (the Czech Republic, Hungary, and Poland) have become more integrated with the EU stock markets in Western Europe (Horvath and Petrovski, 2013). Surprisingly, the seven eurozone CEECs have only partially integrated with these countries. This may be attributed to the lack of major stock market reforms among these countries. There have still existed huge differences among these countries in terms of economic, political, institutional, and structural development. Characteristics such as ownership structure, market concentration, and the size and importance of different delivery channels have varied drastically among them. This has seriously undermined their financial stability and adversely affected the shock-absorptive capacity of the financial systems. The CEEC still have not implemented the major regulatory changes to achieve deeper stock market integration (Georgantopoulos et al., 2015). This has diminished the stock market size effect on growth. Second, the weak FDI-stock market size effect can be explained by the occurrence of the US financial crisis of 2008. Facing bankruptcy, institutional investors have liquidated most of their stocks, bonds, and currencies from the emerging countries' stock markets including those in the CEEC. They have reallocated their investments in the safer assets like the US government bonds. As a result, the CEEC stock markets have lost over half of their value in late 2008 (Syllignakis and Kouretas, 2010). This crisis has slowed their stock market integration with the EU countries for 2008–2009. Equally important, the eurozone debt crisis since 2010 has caused economic slowdown among the major EU countries. They in turn have drastically reduced their FDI

in the CEEC. As shown in the results in section 4.3, FDI alone has ceased to boost growth in the EU through 2005–2012. Due to the financial and debt crises, the CEEC have experienced slow stock market expansion and declining FDI inflows from EU countries. This has contributed to their small FDI-stock market size effect on growth since 2008.

Contrary to expectations, the results indicate the negative FDI-bank credit interaction effect on growth. In contrast to the insignificant 2SLS coefficients, the GMM coefficients on *FDI*BankCred* are negative and statistically significant through 1997–2004. But the coefficients no longer remain significant through 2005–2012. This implies that FDI-bank credit interaction has had no impact on growth since EMU membership. To the contrary, FDI interaction has resulted in the lower growth before membership. This can be explained by the lack of well-developed banking systems among the CEEC. Effective bank regulations have not been implemented to better manage the growing bank FDI (Rousseau and Wachtel, 2011). The huge EU bank FDI inflows since the 1990s through mergers and acquisitions have dominated the CEEC banking sectors. The excessive bank concentration has resulted in the lower bank competition. Growing FDI and bank credit flows might be allocated for speculative rather than productive investment projects. Therefore, growing bank credit flows have had a negative effect on growth (Ductor and Grechyna, 2015). Second, the lack of the positive interaction effect through 2005–2012 can be attributed to an over reliance on EU bank credit inflows. The majority of the newly privatized CEEC banks have been acquired by EU banks since EMU membership. This has caused the supply of their FDI and foreign bank credits to become volatile. The US financial crisis since 2008 and the eurozone debt crisis since 2010 have drastically decreased EU FDI and bank credits in the CEEC. The EU countries have experienced a huge bank credit decline due to serious debt problems in some of their member countries. Consequently, they have substantially reduced FDI and bank credits to their affiliate banks in the CEEC. This can explain why the FDI-bank credit interaction has not accelerated growth for 2005–2012.

The other crucial issue is to explore whether FDI interacting with the higher trade openness promotes CEEC economic growth. The results in Table 5 strongly confirm the positive FDI-trade flow interaction effect on growth. The 2SLS and GMM coefficients on *FDI*Trade* are positive and highly significant for the entire period. The sub-period results show that the coefficients only remain significant in the earlier period 1997–2004. This indicates that the FDI-trade flow interaction has actually boosted growth before rather than after EU membership. This is not entirely surprising because the CEEC experienced very high FDI inflows a decade before EU membership. Since the 1990s, the CEEC have established extensive free trade agreements with EU countries to promote trade liberalization. The EU countries have long served as the major export markets for these countries. Therefore, EU membership has not further boosted their bilateral trade flows. Similarly, the CEEC have attracted huge amounts of FDI inflows from EU countries since the late 1990s. Due to the anticipated effect of EU membership, foreign investors have made substantial investments to consolidate their market shares before EU membership. Due to trade and FDI liberalization, high FDI and trade flows have only accelerated growth through 1997–2004. The CEEC-EU trade has improved their export competitiveness as the local firms have advanced their innovative capabilities by learning the technological contents of imports (Herzer, 2012). The EU FDI has promoted growth through technology transfer. This has boosted their production efficiency and product quality. Hence, the FDI-trade flow interaction has led to higher growth through 1997–2004.

Similar to the results for *FDI*Trade*, the results in Table 6 confirm the positive FDI-high-technology export effect on growth. The 2SLS and GMM coefficients on *FDI*HitechExp* are indeed positive and statistically significant for the entire period. The sub-period results show that only the 2SLS coefficient remains significant for 1997–2004. This suggests that the FDI-high-technology export interaction has promoted growth before EU membership. The explanation for the positive growth effect of FDI through 1997–2004 has been provided above. For the high-technology export effect, the higher CEEC-EU trade flows have facilitated their export emphasis on high-technology exports before joining the EU. By adapting the foreign technologies, the local firms have upgraded the technological content of their exports (Sohinger, 2005). Hence, the FDI-high-technology export interaction has accelerated growth through 1997–2004.

The final concern is whether FDI interacting with the better educated labour force increased CEEC economic growth. The results in Tables 5 and 6 consistently show the negative FDI-labour education interaction effect on growth. Surprisingly, the 2SLS and GMM coefficients on *FDI*School* are negative and significant for the entire period. As shown by the sub-period results, the negative coefficients only remain significant for 1997–2004. This indicates that the FDI-labour education interaction has no impact on growth after EU membership. Instead, the interaction has actually decreased growth before EU membership. As explained earlier, better human capital indicators such as education expenditure and educational attainment are not used in this study because of the missing data problem. The result of the lack of FDI-labour education effect on growth must be interpreted with caution. To a certain extent, this surprising result may be attributed to the rigidities and unproductive practices in the CEEC labour markets. The inefficient labour markets have prevented higher educational levels to translate into higher wage employment (Kottaridi and Stengos, 2010). The markets have remained inflexible to allow educated workers to transfer from low-technology to high-technology industries. Most of the newly established high-technology companies have been dominated by EU FDI. They have concentrated the crucial R&D activities in their home countries rather than in their affiliates in the CEEC. Most of the local labour has been unable to enter the high-technology industries. As the human capital has not adapted the new technologies, this has impeded long-term growth. This may explain why FDI-labour education interaction has not accelerated growth at all.

4.3. Other Explanatory Variables Affecting Economic Growth

There are several explanatory variables that can determine CEEC economic growth. The results support the argument that higher FDI inflows boost growth. As noted in Tables 1 and 2, the positive coefficients on *FDI* become highly significant for the entire period when *HitechExp* rather than *Trade* is included in the estimation. The positive FDI effect on growth may only appear after controlling for the high-technology export proportion effect. The sub-period results also indicate that the 2SLS coefficient remains positive in the pre-EU period 1997–2004. This suggests the anticipated positive effect of EU membership. The deepened integration has stimulated more FDI inflows as investors have expected the CEEC to implement major reforms, institutional improvements, and sound economic policy. This has led to more growth-enhancing FDI (Friedrich et al., 2013). These FDI inflows before EU membership have enabled foreign investors to consolidate their market shares. They have been able to gain better access to entire EU markets. Surprisingly, FDI has no effect on

growth after EU membership. None of the 2SLS coefficients are statistically significant through 2005–2012. FDI has ceased to increase as the foreign investors have already made huge FDI in these countries during the pre-EU period.

A relevant issue is whether the domestic investment has a positive impact on growth after controlling for the FDI effect. As presented in Tables 1 and 2, the 2SLS and GMM coefficients on *DomInv* are positive and highly significant as expected for the entire period. This suggests that the domestic investment flows have boosted growth despite the FDI effects. This also confirms that FDI has not crowded out the domestic investment effect on growth. In most cases, local firms cannot compete with foreign firms with advanced technologies. As the foreign firms gain most of the local market share, the local firms would exit the market (Borensztein et al., 1998). Their domestic investments would decrease. But the results are contrary to this argument. To counter the competition from foreign firms, local firms have increased their domestic investments to improve their production efficiency and product quality. This has helped consolidate their local and foreign market shares. Moreover, the local firms have benefited from FDI through technology transfer. They have adapted these technologies to boost their productivity. This may explain why domestic investment has accelerated growth despite growing FDI inflows.

Another surprising result is that government R&D spending rather than business R&D spending has contributed to higher growth. The 2SLS coefficients on *RDGov* are all positive and significant in all specifications. By contrast, the coefficients on *RDBus* only become significant when the specification includes *HitechExp* rather than *Trade* in the estimation. Besides, the coefficient on *RDGov* is larger than that of *RDBus* in size. This result is quite surprising given the different objectives of these types of research funding. The business research tends to be more applied research for commercial use, compared to the less applied and more basic orientation of the government research. The business research would normally contribute more to economic growth. However, the results indicate that the government R&D spending has resulted in higher growth than the business R&D spending. This may be explained by the lack of private R&D activities in the CEEC. The majority of their R&D activities have depended on public funding. The increase in government R&D spending has partly compensated for the low level of business R&D spending (Silaghi et al., 2014). This may explain why the government R&D spending has primarily boosted growth.

5. Implications for Long-Term CEEC Economic Growth

The results provide important implications for CEEC economic growth in the long run. They provide highly valuable suggestions on how to maintain sustainable and higher growth. First, the results indicate that there is a rather weak positive stock market effect on growth. The higher bank credit flows have even had a negative effect on growth. Despite EMU membership, most of the CEEC stock markets have not been fully developed to deal with the growing capital inflows. The rapid stock market expansion has been mainly facilitated by the early privatization and the entry of foreign investors. Nonetheless, these stock markets have remained highly underdeveloped in terms of financial depth (Caporale et al., 2015). Besides, most of them have become partially integrated with some of the major foreign stock markets, especially the German and US stock markets. Their stock market integration has been accelerated by the huge German and US investments. The large increase in stock market

capitalization has been mainly attributed to considerable foreign participation (Syllignakis and Kouretas, 2010). But major economic shocks such as the financial crisis significantly slow stock market activities. To boost the stock market effect, major stock market reforms should be implemented to establish a proper institutional and corporate governance framework. Better market regulatory and supervisory mechanisms would increase their appeal to more eurozone stock markets. The stock market size would continue to expand so that more external finance can become available for productive investments. For the negative bank credit effect, the EU banks have dominated the CEEC banking sectors through mergers and acquisitions. This has substantially reduced bank competition. The bank credit increase due to huge foreign bank presence might not be allocated for productive investments such as technological advances (Ductor and Grechyna, 2015). To achieve a positive bank credit effect, the CEEC should implement much deeper banking sector reforms. Better banking regulatory frameworks should be built to improve banking supervision and access to foreign bank capitals. As the foreign mergers and acquisitions have led to excessive bank concentration, new anti-trust legislations should be established to maintain a high level of banking competition. The elimination of the abuse of dominant positions would improve the bank credit allocation process (Georgantopoulos et al., 2015). Ultimately, the increase in bank credit flows would be allocated for more long-term productive projects.

Second, the results confirm that FDI inflows have the expected positive effect on growth. However, they have ceased to be growth-enhancing since EU membership. Moreover, the FDI-trade flow interaction has boosted growth before membership. The CEEC should develop more comprehensive FDI and trade policies to accelerate growth. They should diversify the source of their FDI inflows beyond EU countries. The EU countries have not substantially increased their FDI in the CEEC during the period of EU membership. The growth-enhancing effects of FDI and trade have already been exhausted prior to EU membership. To further increase FDI inflows, the CEEC should target new foreign investors outside the EU. They can further reduce entry barriers for foreign companies specializing in high-technology industries. In fact, the results indicate that the FDI-high-technology export interaction has accelerated growth. EU high-technology companies have mainly located their affiliates in the CEEC for assembly purposes. The similar companies outside the EU would increase the R&D activities in these countries. Lower cost production using highly educated labour force allows these companies to achieve higher production efficiency. Equally important, local firms would benefit from new FDI inflows through technology spillovers. They can incorporate these technologies to boost their production and product competitiveness. This would facilitate higher export flows to high-income markets (Cuaresma and Worz, 2005; Sohinger, 2005).

Finally, the results confirm that government R&D spending rather than business R&D spending has mainly contributed to growth. Due to the high costs involved, most of the innovative activities are still financed by the government. The private financing for these activities has remained quite limited as very few local high-technology companies have been established. EU high-technology companies have seldom located major R&D activities in these countries. To promote innovative activities, CEEC governments have increased public financing to offset the shortfall in private financing (Silaghi et al., 2014). Given the availability of a highly educated labour force, governments should boost funding for both private and public R&D activities. More public funding including tax credits and subsidies should be provided to local firms with breakthrough technologies. Moreover, governments should

increase funding for university research activities. These research works should be more applied and commercially oriented as they would have higher rates of profit return than less applied research. To accelerate technological progress, CEEC governments should give more funding for collaborative R&D projects between universities and private companies. Such joint efforts would allow them to undertake more costly innovative projects. High technological progress would enable the CEEC to maintain higher sustainable growth in the long run.

6. Conclusion

This study examines whether financial market integration has accelerated CEEC economic growth through 1997–2012. First, the results indicate that growth in stock market size has only slightly boosted growth before EMU membership. This is due to the anticipated positive effect of stock market expansion. The more surprising result is the lack of a stock market size effect since EMU membership. This can be explained by underdeveloped stock markets in terms of financial depth. The stock markets have been established without proper institutional and corporate governance frameworks. Second, the results suggest that the higher bank credit flows have slowed growth since EMU membership. The reason is that the dominance of EU banks has reduced bank competition in the CEEC. The increase in bank credits might be used for speculative rather than productive investments. The negative bank credit effect has further increased since EMU membership, as there has been a lack of effective banking regulations to better manage the massive bank FDI inflows. Third, the results show that the FDI-stock market size interaction has slightly promoted growth despite EMU membership. The different levels of stock market integration between individual CEECs and EU countries have diminished the interaction effect. Given the huge differences in economic, political, and structural development, the CEEC still have not implemented major regulatory changes to achieve deeper stock market integration. Finally, the results indicate that the FDI-bank credit interaction has slowed growth before EU membership. Effective bank regulations have not been implemented to better monitor the growing bank FDI. The lack of well-developed banking systems has eliminated the positive bank credit effect on growth.

The results provide important implications for boosting CEEC long-term growth. To boost the positive stock market size effect, major stock market reforms should be implemented to establish proper institutional and corporate governance frameworks. Better market regulatory and supervisory mechanisms would increase their appeal to more eurozone stock markets. To achieve a positive bank credit effect, deeper banking sector reforms should be carried out to establish better banking regulatory frameworks. This can improve banking supervision and access to foreign bank capital. Moreover, FDI inflows have only had the expected positive effect on growth before rather than after EU membership. Therefore, the FDI-trade flow interaction has the same effect during this period. To maximize this interaction effect, more comprehensive FDI and trade policies should be developed to diversify the source of FDI inflows beyond EU countries. Better coordinated policies can further reduce entry barriers for foreign companies specializing in high-technology industries. This would help increase the high-technology industries over the long run.

Table 1. 2SLS and GMM Estimates of the Financial Integration Effect on Economic Growth

	(1) 1997-2012 2SLS	(2) 1997-2004 2SLS	(3) 2005-2012 2SLS	(4) 1997-2012 GMM	(5) 1997-2004 GMM	(6) 2005-2012 GMM
DomInv	2.679**	1.932	4.550*	1.838	-2.420	3.160***
	(2.297)	(1.365)	(1.617)	(1.150)	(-0.997)	(2.657)
School	-0.340	2.006	-4.084	1.255	2.026	4.564
	(-0.215)	(0.541)	(-1.013)	(0.453)	(0.366)	(0.586)
GovExp	-0.915	-1.248	1.671	-2.461**	-0.755	-4.204
	(-0.946)	(-0.963)	(0.505)	(-2.057)	(-0.536)	(-1.342)
FDI	0.566	0.746	-0.395	0.149	0.254	-0.133
	(1.287)	(1.252)	(-0.320)	(0.226)	(0.428)	(-0.267)
StkCap	0.151	0.263	1.012	0.455	0.719*	0.831
	(0.726)	(0.828)	(1.276)	(1.305)	(1.874)	(1.520)
BankCred	-1.390***	-0.495	-2.730*	-0.981***	-0.405	-1.439***
	(-3.689)	(-0.943)	(-1.768)	(-2.538)	(-0.599)	(-2.807)
Trade	1.932***	2.875*	6.811	4.566**	5.103***	5.667
	(2.445)	(1.680)	(1.232)	(1.937)	(3.320)	(1.432)
RDBus	0.283	0.420	-0.549	0.239	0.447	-0.433
	(1.479)	(1.318)	(-0.377)	(0.685)	(1.153)	(-0.448)
RDGov	0.611*	1.989**	-0.208	0.702	1.320	0.460
	(1.763)	(2.208)	(-0.368)	(1.237)	(0.862)	(0.768)
Adj. R^2	0.377	0.111	0.545			
J-statistic				19.171	8.839	4.643
AR(1) Test				-3.544	-2.736	-3.148
(p-value)				(0.001)	(0.006)	(0.002)
AR(2) Test				0.148	0.426	0.049
(p-value)				(0.883)	(0.669)	(0.961)
Obs.	208	104	104	208	104	104

Notes: 2SLS and GMM refer to the two-stage least squares and system generalized method of moments estimation, respectively. Regressions (1) to (3) are controlled for the cross-section fixed effects. All variables are in logarithms. T-statistics are reported in parentheses. Cluster-robust standard errors are used.
***, ** and * indicate significance at 1%, 5% and 10%.

Table 2. 2SLS and GMM Estimates of the Financial Integration Effect on Economic Growth

	(1) 1997-2012 2SLS	(2) 1997-2004 2SLS	(3) 2005-2012 2SLS	(4) 1997-2012 GMM	(5) 1997-2004 GMM	(6) 2005-2012 GMM
DomInv	1.852**	1.858	2.371**	-0.630	-1.944	2.256**
	(2.323)	(1.195)	(2.039)	(-0.301)	(-0.666)	(2.007)
School	-1.201	2.528	-3.441	0.376	2.635	-1.009
	(-0.710)	(0.658)	(-0.958)	(0.077)	(0.421)	(-0.154)
GovExp	-1.713*	-1.478	-2.368	-1.456	-0.642	-7.174***
	(-1.686)	(-1.038)	(-1.139)	(-0.725)	(-0.424)	(-2.777)
FDI	0.723**	0.982*	0.426	1.312**	0.309	0.386
	(2.283)	(1.626)	(0.919)	(2.168)	(0.456)	(1.361)
StkCap	0.313	0.305	0.564	0.129	0.773*	0.460
	(1.450)	(0.862)	(1.273)	(0.240)	(1.773)	(1.009)
BankCred	-1.358***	-0.473	-2.109***	-0.979	-0.214	-1.519***
	(-4.427)	(-0.805)	(-2.855)	(-1.439)	(-0.298)	(-2.743)
HitechExp	0.329***	0.607*	0.327	0.381	0.509	0.418
	(2.460)	(1.736)	(0.780)	(0.868)	(1.239)	(0.912)
RDBus	0.377*	0.362	0.767*	0.578	0.435	0.412
	(1.839)	(1.018)	(1.694)	(1.119)	(1.044)	(0.614)
RDGov	0.783**	2.341***	-0.069	1.301	1.412	0.295
	(2.171)	(2.600)	(-0.114)	(1.533)	(0.854)	(0.489)
Adj. R^2	0.276	0.100	0.588			
J-statistic				7.086	13.328	5.434
AR(1) Test				-2.917	-2.244	-3.401
(p-value)				(0.004)	(0.025)	(0.001)
AR(2) Test				-0.778	-0.012	-0.268
(p-value)				(0.437)	(0.991)	(0.788)
Obs.	208	104	104	208	104	104

Notes: 2SLS and GMM refer to the two-stage least squares and system generalized method of moments estimation, respectively. Regressions (1) to (3) are controlled for the cross-section fixed effects. All variables are in logarithms. T-statistics are reported in parentheses. Cluster-robust standard errors are used.
***, ** and * indicate significance at 1%, 5% and 10%.

Table 3. 2SLS and GMM Estimates of the Interaction Effect on Economic Growth

	(1) 1997-2012 2SLS	(2) 1997-2004 2SLS	(3) 2005-2012 2SLS	(4) 1997-2012 GMM	(5) 1997-2004 GMM	(6) 2005-2012 GMM
DomInv	1.964***	2.744***	4.392***	2.652***	1.586	2.738***
	(3.846)	(3.429)	(5.209)	(3.927)	(1.317)	(3.000)
School	-3.217**	-1.328	-8.819***	-0.387	-0.652	-1.786
	(-2.016)	(-0.573)	(-2.521)	(-0.149)	(-0.220)	(-0.386)
GovExp	-1.263	-0.802	0.892	-2.256**	-0.886	-5.381**
	(-1.332)	(-0.871)	(0.417)	(-2.229)	(-0.778)	(-2.070)
Trade	0.689	4.749***	4.788***	4.999***	4.837***	4.472***
	(1.253)	(4.561)	(3.352)	(5.401)	(3.682)	(2.859)
RDBus	-0.182	0.307	-0.427	0.047	0.412	-0.682
	(-1.046)	(1.272)	(-0.948)	(0.169)	(1.263)	(-1.138)
RDGov	-0.017	0.909*	-0.434	0.398	0.803	-0.177
	(-0.048)	(1.785)	(-0.782)	(0.908)	(1.097)	(-0.335)
*FDI*StkCap*	0.003**	0.001	0.002	0.001	0.003	0.001
	(2.189)	(0.172)	(1.261)	(0.949)	(1.093)	(0.885)
*FDI*BankCred*	-0.004	-0.109	0.030	-0.079*	-0.226**	-0.020
	(-0.087)	(-1.338)	(0.524)	(-1.738)	(-2.287)	(-0.376)
Adj. R^2	0.272	0.463	0.553			
J-statistic				27.408	17.162	15.568
AR(1) Test				-4.782	-3.579	-3.104
(p-value)				(0.001)	(0.003)	(0.002)
AR(2) Test				0.673	0.996	0.517
(p-value)				(0.501)	(0.319)	(0.605)
Obs.	208	104	104	208	104	104

Notes: 2SLS and GMM refer to the two-stage least squares and system generalized method of moments estimation, respectively. Regressions (1) to (3) are controlled for the cross-section fixed effects. All variables are in logarithms. T-statistics are reported in parentheses. Cluster-robust standard errors are used.
***, ** and * indicate significance at 1%, 5% and 10%.

Table 4. 2SLS and GMM Estimates of the Interaction Effect on Economic Growth

	(1) 1997-2012 2SLS	(2) 1997-2004 2SLS	(3) 2005-2012 2SLS	(4) 1997-2012 GMM	(5) 1997-2004 GMM	(6) 2005-2012 GMM
DomInv	1.925***	3.012***	3.317***	3.131***	2.399*	2.761***
	(3.801)	(3.669)	(4.007)	(4.337)	(1.884)	(2.797)
School	-2.373	-0.810	-8.115**	0.084	-0.435	-0.371
	(-1.450)	(-0.344)	(-2.179)	(0.030)	(-0.139)	(-0.076)
GovExp	-1.643**	-1.078	-3.908**	-3.026***	-0.806	-8.877***
	(-1.792)	(-1.149)	(-1.999)	(-2.845)	(-0.681)	(-3.856)
HitechExp	-0.164	0.900***	-0.581	0.487**	0.770***	-0.061
	(-1.460)	(4.023)	(-1.589)	(2.012)	(2.544)	(-0.148)
RDBus	-0.104	0.130	0.427	0.199	0.390	-0.061
	(-0.620)	(0.537)	(0.986)	(0.683)	(1.148)	(-0.097)
RDGov	0.092	1.216***	0.231	0.465	0.998	-0.150
	(0.269)	(2.379)	(0.391)	(0.999)	(1.308)	(-0.271)
*FDI*StkCap*	0.003**	0.003	0.002	0.002	0.005	0.001
	(2.279)	(1.095)	(1.176)	(1.170)	(1.415)	(0.740)
*FDI*BankCred*	0.004	-0.123	0.064	-0.036	-0.230**	0.024
	(0.092)	(-1.468)	(1.091)	(-0.760)	(-2.228)	(0.431)
Adj. R^2	0.274	0.438	0.508			
J-statistic				39.319	22.462	15.883
AR(1) Test				-4.523	-3.196	-3.132
(p-value)				(0.001)	(0.001)	(0.002)
AR(2) Test				-0.265	0.276	0.292
(p-value)				(0.791)	(0.783)	(0.771)
Obs.	208	104	104	208	104	104

Notes: 2SLS and GMM refer to the two-stage least squares and system generalized method of moments estimation, respectively. Regressions (1) to (3) are controlled for the cross-section fixed effects. All variables are in logarithms. T-statistics are reported in parentheses. Cluster-robust standard errors are used.
***, ** and * indicate significance at 1%, 5% and 10%.

Table 5. 2SLS and GMM Estimates of the Interaction Effect on Economic Growth

	(1) 1997-2012 2SLS	(2) 1997-2004 2SLS	(3) 2005-2012 2SLS	(4) 1997-2012 GMM	(5) 1997-2004 GMM	(6) 2005-2012 GMM
DomInv	2.964***	1.763*	3.011***	2.856***	-1.618	3.166***
	(5.119)	(1.648)	(3.194)	(3.410)	(-0.894)	(3.327)
GovExp	-2.035***	-1.746*	-1.993	-3.527***	-1.031	-7.250***
	(-2.507)	(-1.640)	(-1.109)	(-3.283)	(-0.794)	(-2.967)
StkCap	0.375**	0.546**	0.712**	0.432	0.820**	0.484
	(2.086)	(-2.257)	(2.111)	(1.469)	(2.235)	(1.255)
BankCred	-1.549***	-0.711*	-2.449***	-0.692*	-0.049	-1.379***
	(-7.760)	(-1.676)	(-4.914)	(-1.761)	(-0.077)	(-2.746)
RDBus	0.442***	0.453*	0.589	0.431	0.483	0.326
	(2.773)	(1.799)	(1.545)	(1.479)	(1.325)	(0.545)
RDGov	0.678**	1.228**	0.056	0.671	0.264	0.370
	(2.200)	(2.337)	(0.107)	(1.417)	(0.311)	(0.656)
*FDI*Trade*	0.631**	1.217**	0.771	0.811*	1.409**	0.834
	(2.230)	(2.308)	(1.404)	(1.873)	(2.126)	(1.348)
*FDI*School*	-0.604**	-1.385***	-0.741	-0.853*	-1.659**	-0.821
	(-1.987)	(-2.385)	(-1.259)	(-1.822)	(-2.258)	(-1.244)
Adj. R^2	0.463	0.376	0.618			
J-statistic				36.741	17.029	7.671
AR(1) Test				-4.872	-2.807	-3.277
(p-value)				(0.001)	(0.005)	(0.001)
AR(2) Test				-0.771	-0.183	-0.377
(p-value)				(0.441)	(0.855)	(0.705)
Obs.	208	104	104	208	104	104

Notes: 2SLS and GMM refer to the two-stage least squares and system generalized method of moments estimation, respectively. Regressions (1) to (3) are controlled for the cross-section fixed effects. All variables are in logarithms. T-statistics are reported in parentheses. Cluster-robust standard errors are used.
***, ** and * indicate significance at 1%, 5% and 10%.

Table 6. 2SLS and GMM Estimates of the Interaction Effect on Economic Growth

	(1) 1997-2012 2SLS	(2) 1997-2004 2SLS	(3) 2005-2012 2SLS	(4) 1997-2012 GMM	(5) 1997-2004 GMM	(6) 2005-2012 GMM
DomInv	2.603***	1.869*	2.668***	2.929***	-0.789	3.015***
	(4.771)	(1.769)	(2.946)	(3.459)	(-0.434)	(3.222)
GovExp	-2.557***	-1.963*	-3.045*	-3.616***	-1.018	-8.119***
	(-3.231)	(-1.894)	(-1.848)	(-3.389)	(-0.783)	(-3.591)
StkCap	0.487***	0.570**	0.694**	0.481*	0.802**	0.454
	(2.800)	(2.349)	(1.969)	(1.657)	(2.105)	(1.158)
BankCred	-1.603***	-0.743*	-2.451***	-0.681*	-0.110	-1.356***
	(-7.482)	(-1.772)	(-4.873)	(-1.743)	(-0.171)	(-2.694)
RDBus	0.480***	0.378	0.662*	0.438	0.392	0.438
	(2.969)	(1.543)	(1.734)	(1.509)	(1.072)	(0.732)
RDGov	0.756***	1.418***	0.150	0.609	0.266	0.337
	(2.433)	(2.768)	(0.289)	(1.291)	(0.308)	(0.596)
*FDI*HitechExp*	0.103**	0.333***	0.034	0.146*	0.167	0.071
	(2.006)	(2.792)	(0.398)	(1.751)	(1.032)	(0.748)
*FDI*School*	-0.194	-0.881***	-0.008	-0.359*	-0.529	-0.122
	(-1.417)	(-2.913)	(-0.035)	(-1.625)	(-1.273)	(-0.481)
Adj. R^2	0.458	0.391	0.611			
J-statistic				36.786	19	7.735
AR(1) Test				-4.535	-2.633	-3.326
(p-value)				(0.001)	(0.009)	(0.001)
AR(2) Test				-1.113	-0.568	-0.278
(p-value)				(0.266)	(0.570)	(0.781)
Obs.	208	104	104	208	104	104

Notes: 2SLS and GMM refer to the two-stage least squares and system generalized method of moments estimation, respectively. Regressions (1) to (3) are controlled for the cross-section fixed effects. All variables are in logarithms. T-statistics are reported in parentheses. Cluster-robust standard errors are used.
***, ** and * indicate significance at 1%, 5% and 10%.

References

Arcand J.- L., Berkes E., Panizza U. 2015. Too Much Finance? *Journal of Economic Growth*, Vol. 20, No. 2, pp. 105-148.

Beck T, Levine R. 2002. Industry Growth and Capital Allocation: Does Having a Market- or Bank-Based System Matter? *Journal of Financial Economics*, Vol. 64, No. 2, pp. 147-180.

Bonin J. P., Hasan, I, Wachtel P. 2005. Privatization Matters: Bank Efficiency in Transition Countries. *Journal of Banking and Finance*, Vol. 29, No. 8-9, pp. 2155-2178.

Borensztein E, De Gregorio J, and Lee J-W. 1998. How Does Foreign Direct Investment Affect Economic Growth? *Journal of International Economics*, Vol. 45, No. 1, pp. 115-135.

Caporale G. M., Rault C., Sova A. D., Sova R. 2015. Financial Development and Economic Growth: Evidence from 10 New European Union Members." *International Journal of Finance and Economics*, Vol. 20, No. 1, pp. 48-60.

Cieslik A., Tarsalewska M. 2011. External Openness and Economic Growth in Developing Countries. *Review of Development Economics*, Vol. 15, No. 4, pp. 729-744.

Cuaresma J. C., Worz J. 2005. On Export Composition and Growth. Weltwirtsch Arch, Vol. 141, No. 1, pp. 33-49.

Dort T., Meon P.-G., Sekkat K. 2014. Does Investment Spur Growth Everywhere? Not Where Institutions Are Weak. *Kyklos*, Vol. 67, No. 4, pp. 482-505.

Ductor L, Grechyna D. 2015. Financial Development, Real Sector, and Economic Growth. *International Review of Economics and Finance*, Vol. 37, pp. 393-405.

Fink G, Haissa P., Vuksic G. 2009. Contribution of Financial Market Segments at Different Stages of Development: Transition, Cohesion and Mature Economies Compared. J*ournal of Financial Stability*, Vol. 5, No. 4, pp. 431-455.

Ford T. C., Rork J. C., Elmslie B. T. 2008. Foreign Direct Investment, Economic Growth, and the Human Capital Threshold: Evidence from US States. *Review of International Economics*, Vol. 16, No. 1, pp. 96-113.

Friedrich C., Schnabel I., Zettelmeyer J. 2013. Financial Integration and Growth – Why is Emerging Europe Different? *Journal of International Economics*, Vol. 89, No. 2, pp. 522-538.

Georgantopoulos A. G., Tsamis A. D., Agoraki M.-E. K. 2015. The Euro-Adoption Effect and the Bank, Market, and Growth Nexus: New Evidence from EU Panels. *Journal of Economic Asymmetries*, Vol. 12, No. 1, pp. 41-51.

Guiso L., Jappelli T., Padula M., Pagano M. 2004. Financial Market Integration and Economic Growth in the EU. *Economic Policy*, Vol. 19, No. 4, pp. 523-577.

Herwartz H., Walle Y. M. 2014. Openness and the Finance-Growth Nexus. *Journal of Banking and Finance*, Vol. 48, pp. 235-247.

Herzer D. 2012. How Does Foreign Direct Investment Really Affect Developing Countries' Growth? *Review of International Economics*, Vol. 20, No. 2, pp. 396-414.

Horvath R., Petrovski D. 2013. International Stock Market Integration: Central and South Eastern Europe Compared. *Economic Systems*, Vol. 37, No. 1, pp. 81-91.

Koetter M., Wedow M. 2010. Finance and Growth in a Bank-Based Economy. *Journal of International Money and Finance*, Vol. 29, No. 8, pp. 1529-1545.

Kottaridi C., Stengos T. 2010. Foreign Direct Investment, Human Capital, and Non-Linearities in Economic Growth. *Journal of Macroeconomics*, Vol. 32, No. 3, pp. 858-871.

Levine R., Loayza N., Beck T. 2000. Financial Intermediation and Growth: Causality and Causes. *Journal of Monetary Economics*, Vol. 46, No. 1, pp. 31-77.

Linnemann H. 1966. *An Econometric Study of International Trade Flows*. Amsterdam: North Holland.

Mencinger J. 2003. Does Foreign Direct Investment Always Enhance Economic Growth? *Kyklos*, Vol. 56, No. 4, pp. 491-508.

Neto D. G., Veiga F. J. 2013. Financial Globalization, Convergence and Growth: The Role of Foreign Direct Investment. *Journal of International Money and Finance*, Vol. 37, pp. 161-186.

Rioja F., Valev N. 2004. Does One Size Fit all? A Reexamination of the Finance and Growth Relationship. *Journal of Development Economics*, Vol. 74, pp. 429-447.

Rousseau P. L., Wachtel P. 2000. Equity Markets and Growth: Cross-Country Evidence on Timing and Outcomes, 1980-1995. *Journal of Banking and Finance*, Vol. 24, No. 12, pp. 1933-1957.

Rousseau P. L., Wachtel P. 2011. What is Happening to the Impact of Financial Deepening on Economic Growth? *Economic Inquiry*, Vol. 49, No. 1, pp. 276-288.

Sheridan B. J. 2014. Manufacturing Exports and Growth: When is a Developing Country Ready to Transition from Primary Exports to Manufacturing Exports? *Journal of Macroeconomics*, Vol. 42, pp. 1-13.

Silaghi M. I. P., Alexa D., Jude C., Litan C. 2014. Do Business and Public Sector Research and Development Expenditures Contribute to Economic Growth in Central and Eastern European Countries? A Dynamic Panel Estimation. *Economic Modelling*, Vol. 36, pp. 108-119.

Sohinger J. 2005. Growth and Convergence in European Transition Economies: The Impact of Foreign Direct Investment. *Eastern European Economics*, Vol. 43, No. 2, pp. 73-94.

Sterlacchini A. 2008. R&D, Higher Education and Regional Growth: Uneven Linkages Among European Regions. *Research Policy*, Vol. 37, No. 6/7, pp. 1096-1107.

Syllignakis M. N., Kouretas G. P. 2010. German, US, and Central and Eastern European Stock Market Integration. *Open Economies Review*, Vol. 21, No. 4, pp. 607-628.