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BANK TECHNICAL EFFICIENCY, PURE TECHNICAL EFFICIENCY AND SCALE EFFICIENCY, DOES ECONOMIC FREEDOM MATTER? EVIDENCE FROM CENTRAL EUROPE

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Abstract:

The current study attempts to investigate the impact of the limitation of economic freedom on conventional bank technical efficiency and its components (pure technical efficiency and scale efficiency) by using data from the region of central Europe. Non-parametric Data Envelopment Analysis (DEA) is employed to measure the bank's technical efficiency and its components levels. The applied method of estimation consists of "pooled Ordinary Least Square (OLS), Fixed Effect Model (FEM), Random Effect Model (REM), and the Generalized Method of Moments (GMM)" to investigate the influence of economic freedom and other potential determinants on bank efficiency. This study has found that the indicators of Government Spending, Fiscal Health, Business Freedom, Labor Freedom, and Financial Freedom have positive relationships with bank's technical efficiency, pure technical efficiency, and scale efficiency. Contrariwise, Overall Economic Freedom, Monetary Freedom, and Investment Freedom exhibit a negative impact on a bank's technical efficiency and its components. Implications from the study permit the related parties to identify the significant dimensions of economic freedom to the efficiency of the banks to ensure better bank performance.

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Keywords:

Economic Freedom, Technical efficiency, Pure Technical Efficiency, Scale Efficiency, DEA
JEL Classification: E60, G21, G28

Introduction

During last twenty years the processes of integration have been occurred rapidly in the financial market as well as banking sector of central Europe countries. There are numerous imposes of financial deregulations, Economics and monetary union foundation, and Europe banking systems have contributed to those particular integrations. Alongside with these deregulations, the technological changes have also contributed to these integrations and progressive processes, and it tried to increase the competition of the banking industry. Thus, European central bank along with policy makers found that it is important to study the influence of those deviations on the banks' performance. Nevertheless, banks' performance is not the only concerns by bank's mangers in terms of costs minimization or profits maximization they are also concerning about measuring the risk taken for generating beneficial revenues, whereas the central Europe banks are surrounded by a highly competitive banking environment. Moreover, The importance of explorations into efficiency of the banks have been risen in European union during latest years, And growing literatures exists evaluating the effects of various methods of banking regulations such as the capitalization, management, and all the activity of bank that might lead to restriction on its efficiency. Additionally, examining the bank's efficiency led to many facts about any advantages and disadvantages of the bank since bigger information of the efficiency measurements support their managers to decrease the costs and raise profits. As a consequence, searching about weakness that might lead to inefficiency. Bank's managers may create strategies to improve the efficiency. Also, banks have latterly encountered many challenges that influencing their efficiency, for instance, the government restrictions, which had a significant impact on most banks. Only banks that have high levels of efficiency were able to resist these challenges, World Bank, (2014). In fact, a large number of studies have focused on efficiency, since a large number of data is available Garza-García, (2012). Referring to the government restrictions, theoretically government interventions have a significant impact on the financial system of their particular country and banks efficiency specifically, whereas those interventions could be in several ways in order to allow for the government to control on individuals and financial institutions lives and transactions respectively. This is what policy maker and economists call it economic freedom. So what is economic freedom? And how economic freedom affects the efficiency of banks? Economic freedom defined as it is at the heart of individual independency, concerned primarily with the choices' freedom that enjoyed by individuals in using and acquiring economic properties and goods. (Heritage Foundation 2010). There are several causes to argue that economic freedom could have a positive influence on banks' efficiency. Firstly, banks are tend to provide additional funds due to new companies competing in the economy which means banks have the capability for providing extra money to an extensive range of domestic companies. Besides higher economic freedom allows to possibility for the banks to issue more loans to international companies and banks which they have to ensure more variations and a well risk return trade-off for banking sector. Moreover, higher economic freedom normally leads to an enhanced environment for business and higher economic growth and in turn enhanced banks' efficiency. Additionally, the greater the degree of economic freedom is, the greater the bank's profitability is (Holmes

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et al., 2008). This indicates a greater demand for banking services and products. In addition, a greater level of economic freedom leads to lesser inflation and more stable macroeconomic setting. On the other hand, there might be some ways in which better economic freedom may reduce banks' efficiency level. Easier access into the sector and more competition within the sector might weaken the average banks' profitability and durability. Besides, higher economic freedom might allow for higher competition within banking system from shadow banking such as hedge moneys. Therefore, the impact of economic freedom on bank's efficiency is essentially a practical issue. Additionally, the developments of economic freedom during last twenty years permitted to investigate the influences of economic freedom on the several aspects of banks performance explicitly. Moreover, the recent financial crisis disclosed the essentials weaknesses in the regulatory frameworks of the banks. Various policymakers and analysts try to relate the causes of recent dilemmas of the financial industry to the weaknesses of economic freedom characteristics, or to unsuitable regulations with a consensus being designed headed for new and stronger forms of regulations. A developing question in the middle of this argument is: if and how economic freedom can influence the financial institutions performance or the efficiency of banks specifically, The rationale for the theorized relationship between banks efficiency and economic freedom is as follow: the less are the restrictions encountered by banks on how to arrange their procedures and businesses the more effective they ought to be in managing their expenses. Hence, causing a more effective resources allocation process (Chortareas 2013). Furthermore, recent studies and researches in banks are progressively more using the economic freedom as explanatory variables in their analysis that is considering different aspects of bank performance in general, and bank's efficiency specifically (Chortareas, 2011). And the opinion that the freedom of people and firms to follow their economic objectives led to the efficient outputs is as old as the economic sciences themselves, However the theoretical models and majority of previous studies was investigating the impact of some indicators of economic freedom on European banks' overall technical efficiency in general (Chortareas, 2013), instead, there are very limited studies have investigated the impact of economic freedom extensively on the components of technical efficiency (pure technical efficiency PTE and scale efficiency SE) for central Europe banking sectors. Theoretically, since both efficiency components are important and composing the overall technical efficiency (OTE), they could be sensitive and influenced by economic freedom indicators as much as (OTE) itself Berger et la,(1993).

Literature Reviews

A huge number of studies have focused on banking technical efficiency worldwide such as (Athanasoglou, et la, 2008, and Chortareas, 2013). And technical efficiency has been used in many studies instead of allocative and economic efficiency methods. However, there is a lack of studies that have investigated on the components of technical efficiency, which is results, a serious concern about these technical efficiency components (Kumar et la, 2015).

One of the clearest studies that explains the government intervention on financial institutions and limit the economic freedom of individuals and banks is stated by Smith (1776), According to Smith (1776), governments have the right to impose various types of economic limitations on citizen and firms in the country, as well as government could impose various type of taxes, while the revenue of government taxes should be spent on financing the public projects and services to enhance the stability and efficiency of the public economy and financial institutions.

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Another point of view stated by Friedman (1962), his theory identifies several aspects in which open and free market can promote profitability of banks and economic growth. Friedman (1962) stated that banks that are permitted to manage their daily financial services and transactions successfully in a relatively free market come to expect more profitable and efficient.

SokGee (2011) assessed the technical, pure technical, and scale efficiencies of Chinese commercial banks in the years between 2001 and 2007 by applying non-parametric approach DEA. Their findings suggest that the Chinese banks tend to be on average technically inefficient. The technical inefficiency of the bank was driven by pure technical inefficiency indicating that banks were facing the challenge of resource allocation to strike a balance between input and output mixture. Moreover, Gulati (2011) have applied non-parametric approach DEA to evaluate the extent of technical, pure technical and scale efficiencies of Indian banks for the years of 2006/2007. Their findings conclude that in the sample of 51 banks there were 9 banks only who were functioning on the efficiency frontier. The inefficiency based on their study was mostly a caused by managerial inefficiency rather than scale inefficiency. A significant scale efficiency difference was determined between large and medium sized banks. Another study of Tandon et la, (2014) also examined the technical, pure technical and scale efficiencies of the Indian banking sector in the years between 2009 and 2012. The study results suggest that among the 44 banks in the sample only 7 exists on the efficiency frontier. Furthermore, Roy (2014) investigates the efficiency for Indian banks during the Basel changes by applying non-parametric approach DEA. The study results suggest that inefficiency in the banking sector was caused mostly by inadequate size allocation. Kumar & Singh (2015) examined the technical and scale efficiency of Indian banks between 2006 and 2010. Their study used both CRR and BCC models. Their study findings suggest that there was an increase in efficiency as a result of deregulation of the banks. The increase in efficiency causes an increase in both pure technical efficiency and scale efficiency. Their study concludes that there was a significant difference in the technical efficiency between the banks during years of the study. Moreover, Singh & Fida (2015) applied non-parametric approach DEA in order to assess the level of all technical efficiency components for the banks of Oman. The scholar conducted that the scale inefficiency was greater than the pure technical inefficiency in the total technical efficiency. The scale inefficiency was mostly attributed to decreasing return to scale. Additionally, one of recent studies done by Hacini & Dahou (2016) examined the technical, pure technical, and scale efficiency of the Algerian banks in the years between 2000 and 2012. Their findings suggest that the bank's technical efficiency enhanced. The study suggests that the main cause of overall technical inefficiency is from the scale inefficiency. Most of the banks were functioning either under constant returns to scale or decreasing return to scale. Generally, the literatures are showing that banking sectors are susceptible to inefficiencies as a result of either operating at the wrong scale or because of managerial inefficiencies. Depending on the peculiar situation in the country of study, there have been a number of variances in the efficiency of the banking system. Neither scale inefficiency nor pure technical inefficiency is predominant in those studies.

Economic Freedom On Bank Efficiency Components

Economic Freedom is a formative construct which is considered as macroeconomic conditions of a country (Heritage Foundation 2010), The index for Economic Freedom that provided by

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Heritage Foundation is classified into four major areas, According to Sufian and Habibullah (2010) state that the economic freedom is macroeconomic factors that might significantly influence the bank's profitability. In fact there are conflict studies investigated the influence of economic freedom indicators on conventional bank's efficiency In addition to, no known study has examined the influence of overall economic freedom on the components of technical efficiency (pure technical efficiency and scale efficiency), which is the gap of knowledge that this study going to address. Moreover, one of the oldest studies that describe the relationship between open market and growth is done by Friedman (1962). The study suggested that individuals and banks that are permitted to manage their daily economic lives successfully in a relatively free market come to expect more profitable and efficient. In addition to, enhance political and social freedom in the country. Similarly, Chortareas et al. (2013) their study has focused on the influence of financial freedom along with other indicators of economic freedom index on bank's efficiency of European countries, their findings suggested that Higher freedom of the banks from government control permits the bank management to be responsible to their stockholders while imperfect financial freedom can deform the rewards of banks' managements that are responsible to government bodies and seek to meet specific government forced rules.

One of the common studies of the impact of economic freedom on bank's efficiency is conducted by Sufian and Majid (2011) they investigated the economic freedom influence on the efficiency of MENA Islamic banks for the years between 2000 and 2008. They conclude that overall economic freedom has a negative impact on the efficiency of banks under their study. Additionally, a study of Soo-Wah Low (2010) they examined the relationship between economic freedoms and banking system development for East Asian countries between the years of 1975 and 2006, among other indicators they found investment freedom, financial freedom and trade freedom have positive impact on banking system development. Furthermore, Sufian and Zulkhibri (2015) investigate the economic freedom influence on banks' profitability for MENA banking system between the years of 2000 and 2010 applying dynamic panel model. They conclude that greater economic freedom are positively influencing the banks' profitability, implying that lesser interference by the governments in the sector increase banks' profitability.

Djalilov et al, (2016) they studied the impact of economic freedom on banks efficiency components. Several economic freedom indicators were considered in their study. Their results suggest the economic freedom indicators are significantly influence the bank's technical efficiency and its components (pure technical efficiency and scale efficiency.

In conclusion, growing literatures being investigating the relationship between economic freedom indicators and bank's efficiency. Only few studies have investigated the relationship between economic freedom indicators and bank's efficiency components, this should signalize a knowledge gap while these relationships are still unclear and need for further investigations. This study tries to investigate the relationship between economic freedom and conventional bank' efficiency components.

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Hypothesis Development:

H1a: Economic Freedom has a significant influence on banks' overall technical efficiency.
H1b: Economic Freedom has a significant influence on banks' pure technical efficiency.
H1c: Economic Freedom has a significant influence on banks' scale efficiency.

Methodology

Current study is applying annual bank level data of all 95 commercial banks that operating in central Europe region since this region represents the key of emerging aspects of banking and finance worldwide. The data is taken from the period 2011–2019 To take consideration after the global financial crisis from 2008 to 2010. The sample data of 95 commercial banks come from 9 central Europe countries namely (Austria, Bulgaria, Czech Republic, Estonia, Greece, Poland, Romania, Slovakia and Slovenia). The variables are obtained from Fitch connect dataset that contain data for 34000 banks worldwide. Moreover, Fitch Connect database offers the home currencies' data of the specific countries and offers the possibility to convert its data to any other currencies. Since the currencies of these countries are different, this paper uses the US Dollar (USD) currency in order to maintain data standardization. Additionally, to maintain homogeneity, current study is studying commercial banks only in the analysis. Hence, investment banks and specialized development banks are excluded from the sample. Meanwhile, all the data regarding Economic Freedom indicators are obtained from Heritage Foundation dataset. The Heritage Foundation project reports aggregate and individual Economic Freedom indicators that cover 215 economies or countries over the period 1995 to 2019 of four dimensions of Economic Freedom. The four dimensions are 1) Rule of Law, 2) Government Size, 3) Regulatory Efficiency, 4) Open Market. To maintain the best method of analysis, this paper follows two stages of analysis.

First Stage Of Analysis Non-Parametric Data Envelopment Analysis Approach

The non-parametric DEA method is applied to compute the technical efficiency and its components (pure technical efficiency and scale efficiency) of all commercial banks operating in central Europe countries. For the objective of this study, this paper adopts an output maximization orientation, based on the assumption that banks are normally focus on rising (or maximizing) profits Banker et al. (1984). The DEA method includes constructing a non-parametric production frontier reliant on the actual input-output records in the sample relative to which efficiency of each bank in the sample is computed (Coelli et al., (1998) for a complete information). There are several causes why we employ the DEA approach. Firstly, each bank is gave a particular efficiency score that permits ranking among the banks in the sample. Secondly, the DEA approach highlights the zones of development for each particular bank such as either the input which extremely used, or output which under produced by the bank. Thirdly, there is a chance of making inferences on the bank's general profile –the DEA approach permits for evaluation to be made in respect to the production performance of each bank to a set of efficient bank (named a reference set). Fourthly, the DEA approach does not need for a fixed structure or specific functional form to be applied on the data in obtaining efficient frontier, error, and inefficiency structures of the bank (Bauer et al., 1998). Finally, the DEA approach does not need for standardization thus permitting researchers to select arbitrary any type of input and output of managerial interest, irrespective of the dissimilar measurement units (Ariff and Can, 2008; Avkiran, 1999; Berger and Humphrey, 1997). As well as the DEA analysis required inputs and outputs of the banks to analyze the bank's technical efficiency. This study

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follows rough rule of thumb that suggested by Cooper *et al.* (2002). in selecting inputs and outputs. Therefore, the inputs of current study will be as follows: x1 Deposit, x2 Labor and x3 fixed assets whereas the outputs are: y1 loans and y2 investments. The details of inputs-outputs are shown in the following table 1.

Table 1: Bank Inputs-Outputs ($ Million)

Variable	Mean		St. dev.		Median	
	2011	2019	2011	2019	2011	2019
Inputs						
Total Deposits	6297.3	7045.5	8916.5	5889.9	5669.87	5927.06
Personnel Expenses	227.736	244.959	488.444	482.988	585.311	596.891
Fixed Assets	3188.26	2304.35	5660.604	4843.577	91.9912	778.0624
Outputs						
Net Loans	19602.7	15765.6	28424.2	28694.1	5685.13	3633.66
Total Securities	1657.7	1180.5	3875.4	3506.9	394.88	357.07

Second Stage Of Analysis Multivariate Panel Regression Analysis (MPRA)

The main aim of this study is to investigate the influence of economic freedom indictors on all commercial bank's technical efficiency components for central Europe countries, this study uses two types of regressions: 1) panel data regression (static panel) that contains of "pooled Ordinary Least Square (OLS), Fixed Effect Model (FEM), Random Effect Model (REM). 2) Generalized Method of Moments (GMM) (dynamic panel)" to examine the developed model. According to Gujarati (2002) he suggested three types of advantages for using panel regression. Firstly, panel data make the data more informative with variability, reduce collinearity between the variables, and give more degree of freedom to the data. Secondly, panel data consist of well recognition and measurements of effects that easily cannot be seeing in pure cross-sectional or pure time series data. Thirdly, panel data gather the data to be accessible into some thousand units. This might reduce the bias that could result if individuals or financial institution level data are distributed into broad combinations. Moreover, Nickell (1981) claims that the dynamic panel regressions yield biased coefficients expressively over all variables, while if the time shorter applied it would results a large bias. In fact this type of problems could be solved by applying "GMM" as this estimation method is able to consider the reverse causativeness, simultaneity bias, and absent variables by applying lagged dependent variables. Theoretically, using the GMM might generate two advantages: firstly, GMM offers a common structure for examining statistical inference issues because it includes several econometrics estimators. Secondly, it also offers an appropriate technique for the nonlinear dynamic models estimation devoid of complete specialization of the data possibility distribution.

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Table 2: Variables of The Second Stage of Analysis

Variable	Descriptions	Measurements of Variables	Source of Data	Hypothesized Association Type
		Dependent		
lnOTE	Overall Technical Efficiency	PTE*SE	Fitch Connect	NA
lnPTE	Pure Technical Efficiency	OTE/SE	Fitch Connect	NA
lnSE	Scale Efficiency	CRS/VRS	Fitch Connect	NA
		Independent		
		Bank-Specific Characteristics (Internal Determinants)		
lnTA	Bank Size	Total Assets	Fitch Connect	+/-
lnETA	Capitalization	Equity over total assets	Fitch Connect	+/-
lnLOANSTA	Liquidity	Total loans over total assets	Fitch Connect	
lnLLRGL	Credit Risk	Reserves loan loss over total loans	Fitch Connect	+/-
lnNIETA	Overhead Expenses	Non-interest expenses over total assets	Fitch Connect	+/-
		Macroeconomic Factors (External Determinants)		
lnGDP	Economic Growth	Gross domestic product	World Development Indicators	+/-
lnINFL	Inflation	Consumer price index	World Development Indicators	+/-
		Economic Freedom (Heritage Foundation)		
lnOVER_FREE	Overall Economic Freedom	A scale of 100 stages according on	Heritage Foundation	+/-
lnTXP	Tax Burdens		Heritage Foundation	+/-
lnFIS_HLTH	Fiscal Health		Heritage Foundation	+/-
lnGOV_SP	Government Spending		Heritage Foundation	+/-
lnBUSSFREE	Business Freedom		Heritage Foundation	+/-

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nLBR_FREE	Labor Freedom	Heritage Foundation criteria.	Heritage Foundation	+/-
lnMONE_FREE	Monetary Freedom		Heritage Foundation	+/-
lnTADE_FREE	Trade Freedom		Heritage Foundation	+/-
lnINV_FREE	Investment Freedom		Heritage Foundation	+/-
lnFINFREE	Financial Freedom		Heritage Foundation	+/-

Empirical Results And Discussions

First Stage of Analysis (Results and Tests of DEA)

Before proceeding further with the discussion on DEA outcomes, current study examines the rule of thumb on various numerals of inputs and outputs variables as proposed by Cooper *et al.* (2002). Since the overall number of the sample in current study is 95 banks, conventional banks is normally higher than the numeral of input and output variables $n \geq \max (3 \times 2, 3[3+2])$, the selections of variables are valid since they are steady with the rule of thumb, That is permits for the DMUs' efficiencies to be calculated. Additionally, we have applied the intermediation approach under variable return to scale (VRS) assumption that suggested by Banker et la, (1984) in order to in order to identify the efficiency scores of the banks and investigate the different levels of the "overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE)" among conventional banks under this study. The summary of data used to identify the efficiency frontiers for 2011 and 2019 of conventional banks are shown in Table 4.1 below.

Table 3: Average bank's Efficiencies 2011-2019

Efficiency / Years	2011	2012	2013	2014	2015	2016	2017	2018	2019	Mean
OTE	0.505	0.518	0.471	0.437	0.419	0.423	0.407	0.454	0.466	0.455
PTE	0.666	0.667	0.634	0.640	0.608	0.606	0.580	0.579	0.558	0.615
SE	0.774	0.791	0.750	0.693	0.698	0.716	0.726	0.810	0.835	0.754

Second Stage Of Analysis (Results Of Multivariate Panel Regression Analysis)

The regression results that concentrating on the relationship between bank technical efficiency components and the explanatory variables (bank's level and country's level) are presented in Tables 4 to 15. Concerning the bank's size results, (lnTA) exposes a positive relationship with overall technical efficiency (OTE) and its component pure technical efficiency (PTE) only. However, a negative relationship with scale efficiency (SE) for the banks that covered by current study. This result implies that the greater (smaller) size of the banks tend to exhibit higher (lower) overall technical and pure technical efficiencies, and vice versa for bank's scale efficiency. This type of relationship supports to the debate that large banks might benefit from economies of scale which enables them to earn greater revenues. Huge banks might achieve higher management efficiency levels because their costs are well exploit by the bank's

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management and compensated by higher revenues that are generated via quality services. Moreover, large banks may have better abilities to capitalize on enhancement activities and well cost cutting opportunities compared to the small bank. These findings are steady with a number of scholars such as Sufian *et al*. (2012a), Srairi (2010). providing support to the debate that large banks have high levels of technical efficiency components compared to medium or small banks. Similarly, the coefficient of credit risk (lnLLRGL) exhibits a positive relationship with bank's (OTE), (PTE) and (SE), similar finding has been found by Ahamed et al, (2021) Sufian and Habibullah (2009).

Regarding to the influence of capitalization (lnETA) on overall technical efficiency (OTE) and its components as shown in Tables (4 ,8 and 12) that lnETA coefficient exhibits a negative sign in all models in terms of OTE, PTE and SE for conventional banks. Where the well-capitalized banks would decrease banks' profitability due to the higher predicted costs of financial distress, higher predicted bankruptcy costs, and higher risk of portfolio. Such disadvantages would then be interpreted into low profitability (Demirguc-Kunt and Huizinga, 1999). Scholars by Balcombe et al, (2020), Hussain et al, (2020), Sufian (2009b), and Akhigbe and McNulty (2005) they have stated similar results.

The influence of macroeconomic environment on bank efficiency is statistically significant. From the Tables (4, 8 and 12) the GDP has a negative association with banks overall technical efficiency (OTE) and pure technical efficiency (PTE) only, which could be due to the volatile economic growth in the years that are covered in the current study. These developments may have resulted in banks to suffer from lower demand of their financial services and incur more loan defaults. In this respect, Sufian (2009a) found a negative association between bank efficiency and GDP.

Does Economic Freedom Foster Banks' Overall Technical Efficiency, Pure Technical Efficiency And Scale Efficiency?

To deliver the concern of whether economic freedom matters in determining the technical efficiency and its components of conventional banks (main concern of present study), current study re-estimate several regression models and it includes the all significant indicators of the economic freedom index (refer to table 2). The relationships between the ten different indicators of economic freedom index and "overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE)" are analyzed individually to avoid multicollinearity problem. The results are shown in (Models 1 to 36 of Tables 4 until 15) for conventional banks. Referring to overall economic freedom indicator (OVER_FREE), it has a significant negative relationship with overall technical efficiency, pure technical efficiency and scale efficiency. These types of relationships indicate that overall economic freedom is a vital dimension of economic freedom index for all technical efficiency components of the conventional banks, Additionally, The empirical results come as surprise since economic freedom by default is a key to the creation of an environment that allows a complete cycle of entrepreneurship, innovation, and continued growth for economic and flourish improvement. According to our findings, economies with greater level of economic freedom are expected to experience low levels of bank's efficiency. Moreover, the empirical findings confirm that overall economic freedom score could significantly affect not only overall technical efficiency but also pure technical efficiency and scale efficiency. Government spending (GOV_SP) coefficient showed

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a positive sign at the 1% level of statistical significance in all models tested. The empirical findings obviously indicate that government spending (GOV_SP) has a strong positive relationship with overall technical efficiency (OTE), pure technical efficiency (PTE) scale efficiency (SE). This type of relationship implies that the more government spending in the economy the more technical efficiency of banks. Implying that excessive government spending in the economy often leads to efficiency possibly through the channels of adhocracy and higher productivity. The findings of government spending indicator are steady with the most recent study that done by Djalilov and Piesse (2016). Fiscal health (FIS_HLTH) coefficient in showed a positive sign in all models tested. The empirical findings obviously indicate that fiscal health (FIS_HLTH) has a positive relationship with (OTE), (PTE) and (SE). Which is indicates that the more fiscal freedom in the economy the more banks' technical efficiency. Additionally, This type of relationship implies that fiscal health could affect business-cycle volatility and growth, a positive effect on growth is associated with the capability of fiscal policy to relieve fluctuations of the business cycle and level of economic fluctuations by the use of automatic stabilizers hence, it gives an advantage for the banks to operate under well-structured environment in the most effective way. These results on fiscal health are strongly supported the earlier studies that done by (Afonso and Furceri 2010, Heckelman&Knack 2009). Regarding the influence of business freedom (BUSS_FREE) on the banks' technical efficiency components, the empirical findings showed that the coefficient of BUSS_FREE is strongly positive. The results indicates that the greater ability to start, operate, and close businesses are enhancing financial institutions and banks' efficiency in central Europe countries. These findings are steady with by Demirguc-Kunt et al. (2004), and Feldmann (2009), that concentrate on business and labor freedoms on bank efficiencies' components. Furthermore, in term of the influence of business freedom on pure technical efficiency the empirical result of current study approves that freedom of starting/closing businesses, entrepreneurship and foreign investments might improve banks' management to operate efficiently, on the other hand, banks' management is needed to decrease the restrictions of government and operate in low regulated environment in order to work efficiently. Regarding the impact of labor freedom (LBR_FREE) coefficient showed a positive sign. The empirical findings obviously indicate that labor freedom has a positive relationship with (OTE), (PTE) and (SE), which is indicates that the more freedom and flexible labor regulations that proposed by the government the more banks' technical efficiency. Additionally, in order to enhance the growth and profitability of business-cycle or financial market in a country, the government of this particular country has to legislate a clear working policy between workers and employers based on the rationale for protection of workers from arbitrary decisions by employers. Nevertheless, it may raise the costs of organizations to employ workers and regulate employment to the optimal stage. However, it will improve the financial market hence, giving the chance for banks to operate under health economic environment that lead to enhance their technical efficiency. Many of previous studies that relate labor freedom and regulations to the economic outcomes such as output and unemployment for instance: Heckman and Pagés (2000), Blanchard and Wolfers (2000). Regarding to the influence of monetary freedom (MONE_FREE), the coefficient of this indicator is negative and is statistically significant for all models. The empirical findings obviously indicate that monetary freedom has a negative relationship with (OTE), (PTE) and (SE). Additionally, it implies that lower (higher) government intervention in the market increase (decrease) banks' efficiency. Moreover, based on current study results a tight monetary policy might improve banks' profitability. Hence, it could help firms and societies to

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make investments, savings, and other long-term plans effectively. These findings are having an agreement with (Rode and Coll 2011, Gokal & Hanif, 2004). Similarly, the investment freedom (INV_FREE) coefficient showed a negative sign in all models that tested. The empirical findings obviously indicate that investment freedom has a negative relationship with "overall technical efficiency (OTE), pure technical efficiency (PTE) scale efficiency (SE)". Which is indicates that the more investment freedom in the economy the less bank's efficiency. However, the coefficient of financial freedom (FINFREE) showed a positive sign and statistically significant at 1% in all models that approves a positive relationship between financial freedom and bank's overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE), This type of relationship signifying that banking security plus freedom from government control present positive effect on central Europe banks' efficiency. The more banks are controlled by the government, the freer they are to involve in essential financial activities that ease private sector-led economic growth. The results from this study are adding to a certain extent, lend support to Chortareas (2013) who found that the banks which operating in the countries that enjoy with high level of financial freedom tend to have higher levels of banks efficiency.

Controlling For Potential Endogeneity

Generally, the dynamic model results that computed by using the GMM as a main estimation model indicate that credit risks (LLRGL) and capitalization (lnETA) represent as the determinants that significantly affect the level of overall technical efficiency (OTE) on conventional banks. Moreover, size of banks (lnTA) and overhead expenses (NIETA) approved as determinants that have a significant impact on pure technical efficiency (PTE) which is known as a bank's management efficiency. Furthermore, only size of banks (lnTA), capitalization (lnETA) and credit risks (LLRGL) have been confirmed as significant determinants of scale efficiency (SE) in the dynamic models. Referring to the macroeconomic factors (external determinants of bank's efficiency), the economic growth (lnGDP), Inflation (lnINFL) exhibits significant relationship with "overall technical efficiency (OTE) and its components (pure technical efficiency PTE and scale efficiency SE)" on conventional banks. However, current study proceeds with the analysis using GMM estimation method in order to obtain robust results.

Garcia-Herrero *et al*. (2009) suggested that potential endogeneity might be a problem when evaluating banks' profitability determinants. In this respect, Poghosyan and Hesse (2009) propose that empirical studies on the determinants of bank performance could suffer from numerous sources of inconsistencies, such as endogeneity bias, omitted variables and highly persistence performance. For example, most efficient banks could have sufficient resources to provision for their non-performing loans. The more profitable banks could also find it easier to increase their client base through a successful advertising campaign and hiring of highly skilled employees (Garcia-Herrero *et al*. 2009).

To deliver present concern, a lagged dependent variable is introduced in the regression models via the "Generalized Methods of Moments (GMM)" method that presented by Blundell and Bond (1998), Arellano and Bover (1995), and Arellano and Bond (1991). The system GMM permits to control for persistence and endogeneity issues, hence, yield consistent estimates. The GMM joins in a single system, all the regression equations in differences and levels, every single

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one with its set of instrumental variables. By doing so, the current study attempts to exploit the panel structure of the dataset and controls for undetected bank specific effects, potential endogeneity issues of the independent variables, and the use of lagged dependent variables. Thus, the panel data regression technique provides efficient solution and enables valuable inferences to be drawn in respect to the degree of bank's performance across different economic and institutional conditions.

In tables 16 and 17 the Tax Burdens, Government Spending, Fiscal Health, Business Freedom, Labor Freedom, Trade Freedom and Financial Freedom indicators exhibit a positive statistically significant relationship with overall technical efficiency (OTE), that indicate higher (lower) Tax Burdens, Government Spending, Fiscal Health, Business Freedom, Labor Freedom, Trade Freedom, and Financial Freedom tend to increase (reduce) overall technical efficiency (OTE) of conventional banks. Whereas Overall Economic Freedom, Monetary Freedom and Investment Freedom showed a significant negative relationship with overall technical efficiency (OTE) in GMM estimation method. Moreover, the tables 18 and 19 present that Fiscal health, Business Freedom, Trade Freedom, and Financial Freedom have a positive significant relationship with pure technical efficiency (PTE) (management efficiency), which indicate that higher (lower) Fiscal health, Business Freedom, Trade Freedom, and Financial Freedom tend to increase (reduce) pure technical efficiency (PTE) of conventional banks. Whereas Overall Economic Freedom, Monetary Freedom and Investment Freedom exhibit significant negative relationship with pure technical efficiency (PTE) in dynamic panel models.

Furthermore, the tables 20 and 21 show that Tax Burdens, Government Spending, Fiscal Health, Business freedom, Labor freedom Trade Freedom, and Financial Freedom have positive statistical and significant relationship with scale efficiency (SE), that indicate higher (lower) Tax Burdens, Government Spending, Fiscal Health, Business freedom, Labor freedom Trade Freedom, and Financial Freedom to increase (reduce) scale efficiency of conventional banks. Whereas Overall Economic Freedom, Monetary Freedom and Investment freedom indicators exhibit significant and negative relationship with scale efficiency (SE) in dynamic panel models.

Conclusion

This study is limited and contributes to the existing literatures by concentrating on the association between various indicators of the economic freedom on the bank's "overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE)". Our main concentration is on the specific indicators of economic freedom namely overall economic freedom, tax burden, government spending, fiscal health, business freedom, labor freedom, monetary freedom, trade freedom, investment freedom and financial freedom that cover all macroeconomic areas that proposed by Heritage Foundation such as rule of law, government size, regulatory efficiency and market openness for central Europe countries in years between 2011 and 2019. In order to deliver our concern in this study we first employed DEA efficiency scores for 855 bank's observations that operating in the countries of central Europe, The empirical findings for efficiency scores suggest that based on the results presented in this study, there are some differences between "overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE)" among the years that covered by current study. In the second stage we investigate the potential determinants and the impact of economic freedom

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indicators on the bank's technical efficiency components by applying Multivariate Panel Regression Analysis (MPRA) via the pooled Ordinary Least Square (OLS), Fixed Effect Model (FEM), Random Effect Model (REM) and Generalized Method of Moments (GMM) as estimation methods.

A deeper estimation of the findings reveals that bank's size (lnTA) exposes a positive relationship with overall technical efficiency (OTE) and its component pure technical efficiency (PTE) only. However, a negative relationship with scale efficiency (SE), Similarly credit risk (lnLLRGL) exhibits a positive relationship with bank's overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE). However, capitalization (lnETA) has a negative effect on overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE). In terms of macroeconomic factors our findings suggest that the GDP has a negative association with banks overall technical efficiency (OTE) and pure technical efficiency (PTE) only. Furthermore, examining the effect of economic freedom indicators to the bank's technical efficiency components, overall economic freedom (OVER_FREE) have to found a negative relationship between all bank's technical efficiency components, However, Government spending (GOV_SP) has a significant positive association with overall technical efficiency (OTE) and its components (pure technical efficiency PTE and scale efficiency SE). Similarly, fiscal health (FIS_HLTH), business freedom (BUSS_FREE) and labor freedom (LBR_FREE) have significant positive relationships with overall technical efficiency (OTE), pure technical efficiency (PTE) scale efficiency (SE). On the other hand, monetary freedom (MONE_FREE) and investment freedom (INV_FREE) have negative relationships with overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE). Financial freedom (FINFREE) found to have a positive relationship with bank's overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE).

The present study is not without its limitations. It is suggested that future research compare the results derived from the Data Envelopment Analysis (DEA) method with another non-parametric frontier method such as the Free Disposal Hull (FDH). In addition, the analysis may also be performed to compare results derived from the non-parametric method with parametric methods such as Stochastic Frontier Analysis (SFA), Distribution Free Approach (DFA), and Thick Frontier Approach (TFA). Future research may also consider using financial ratio analysis which is considered as the traditional method to measure the efficiency of banks. Moreover, the findings of this study could be useful to regulators and policymakers. For one, regulators and policy makers can find a mechanism to improve the technical efficiency components separately. Additionally, policy makers may be able to design new policies and regulations based on the different dimensions of economic freedom which could enhance the technical efficiency components. Furthermore, the result could prove to be informative for bank managements various strategies need to be taken into consideration to improve bank's technical efficiency and consequently profitability. The findings from this study could also have important ramifications for investors whose main desire is to reap higher profit from their investments. The empirical findings from this study clearly highlight the importance for investors to focus on bank's technical efficiency components since these concepts might help investors to identify firms with a better prospect to generate higher profitability prior to investing.

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APPENDIX

REGRESSION RESULTS ON CONVENTIONAL BANKS OVERALL TECHNICAL EFFICIENCY (OTE)

Table 4: Regression Results on Conventional Banks Overall Technical Efficiency (OTE)

	Model 1				Model 2				Model 3			
	POLS	RE	FE	Robust-FE	POLS	RE	FE2	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	0.0742***	0.0424*	0.141***	0.141***	0.0667***	0.0272	0.229**	0.229	0.0708***	0.0334	0.210**	0.210
	(0.000)	(0.090)	(0.001)	(0.003)	(0.000)	(0.315)	(0.014)	(0.171)	(0.000)	(0.200)	(0.020)	(0.190)
LnLLRGL	0.00504	0.0496***	0.0652***	0.0652***	0.0349	0.0876***	0.0870***	0.0870***	0.0169	0.0677***	0.0705***	0.0705***
	(0.782)	(0.003)	(0.000)	(0.001)	(0.114)	(0.000)	(0.000)	(0.002)	(0.433)	(0.001)	(0.001)	(0.004)
LnETA	0.126**	-0.110*	-0.168**	-0.168	0.127**	-0.101	-0.198**	-0.198	0.154***	-0.0455	-0.133	-0.133
	(0.020)	(0.097)	(0.026)	(0.164)	(0.038)	(0.197)	(0.035)	(0.167)	(0.010)	(0.546)	(0.143)	(0.331)
LnLOANSTA	-0.228***	-0.125	-0.0124	-0.0124	-0.143**	-0.0998	-0.0809	-0.0809	-0.157***	-0.118	-0.0907	-0.0907
	(0.000)	(0.106)	(0.903)	(0.962)	(0.019)	(0.258)	(0.536)	(0.742)	(0.008)	(0.164)	(0.470)	(0.735)
LnNIETA	-0.465***	-0.206***	-0.0138	-0.0138	-0.496***	-0.279***	0.0625	0.0625	-0.498***	-0.312***	-0.0206	-0.0206
	(0.000)	(0.000)	(0.846)	(0.858)	(0.000)	(0.000)	(0.611)	(0.744)	(0.000)	(0.000)	(0.862)	(0.911)
LnGDP					-1.506*	-1.411**	-1.343**	-1.343***	1.690*	1.215*	0.891	0.891
					(0.075)	(0.021)	(0.022)	(0.000)	(0.077)	(0.075)	(0.177)	(0.124)
LnINFL					0.0256	0.0185	0.0131	0.0131	0.0348**	0.0270**	0.0210*	0.0210**
					(0.128)	(0.129)	(0.265)	(0.132)	(0.033)	(0.021)	(0.064)	(0.014)
LnOVER_FREE									-18.76***	-15.46***	-13.21***	-13.21***
									(0.000)	(0.000)	(0.000)	(0.000)
_cons	-3.867***	-1.982***	0.503	0.503	35.32	34.56**	36.53**	36.53***	30.86	30.86**	33.26**	33.26***
	(0.000)	(0.000)	(0.412)	(0.633)	(0.109)	(0.029)	(0.017)	(0.000)	(0.147)	(0.042)	(0.024)	(0.001)
N	771	771	771	771	594	594	594	594	594	594	594	594
R-Squared	0.260	0.290	0.379	0.379	0.242	0.401	0.690	0.690	0.292	0.221	0.568	0.568
Adjusted R-Squared	0.256	0.301	0.302	0.102	0.232	0.269	0.425	0.425	0.285	0.443	0.472	0.472
Hausman		113.88				94.26				73.09		
F-Test	53.89	11.35	5.284	3.152	26.66	13.97	7.545	6.789	30.19	12.30	12.39	12.90

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Regression Results on Conventional Banks Overall Technical Efficiency (OTE)

	Model 4				Model 5				Model 6			
	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	0.0667***	0.0271	0.233**	0.233***	0.0698***	0.0398	0.121	0.121	0.0808***	0.0819***	0.149**	0.149
	(0.000)	(0.319)	(0.004)	(0.003)	(0.000)	(0.136)	(0.170)	(0.431)	(0.000)	(0.001)	(0.037)	(0.261)
LnLLRGL	0.0346	0.0877***	0.0865***	0.0865***	0.0125	0.0616***	0.0645***	0.0645***	-0.0290	0.0104	0.0161	0.0161
	(0.118)	(0.000)	(0.000)	(0.002)	(0.559)	(0.002)	(0.002)	(0.009)	(0.136)	(0.515)	(0.331)	(0.367)
LnETA	0.127**	-0.101	-0.199**	-0.199	0.176***	0.00904	-0.0473	-0.0473	0.264***	0.252***	0.272***	0.272***
	(0.039)	(0.196)	(0.034)	(0.172)	(0.003)	(0.904)	(0.596)	(0.704)	(0.000)	(0.000)	(0.000)	(0.004)
LnLOANSTA	-0.142**	-0.0998	-0.0794	-0.0794	-0.174***	-0.150*	-0.140	-0.140	-0.230***	-0.262***	-0.291***	-0.291
	(0.020)	(0.259)	(0.544)	(0.747)	(0.003)	(0.076)	(0.252)	(0.541)	(0.000)	(0.000)	(0.003)	(0.267)
LnNIETA	-0.496***	-0.278***	0.0608	0.0608	-0.495***	-0.284***	0.0364	0.0364	-0.501***	-0.344***	-0.101	-0.101
	(0.000)	(0.000)	(0.621)	(0.752)	(0.000)	(0.000)	(0.751)	(0.828)	(0.000)	(0.000)	(0.269)	(0.466)
LnGDP	-1.552*	-1.408**	-1.375**	-1.375***	-2.253***	-2.146***	-2.011***	-2.011***	1.878**	1.729***	1.742***	1.742***
	(0.071)	(0.023)	(0.021)	(0.000)	(0.006)	(0.000)	(0.000)	(0.000)	(0.014)	(0.000)	(0.000)	(0.000)
LnINFL	0.0246	0.0185	0.0123	0.0123	0.00783	0.00268	-0.000129	-0.000129	0.00658	0.00360	0.00210	0.00210
	(0.153)	(0.137)	(0.304)	(0.186)	(0.631)	(0.813)	(0.991)	(0.987)	(0.649)	(0.680)	(0.808)	(0.762)
LnTXB	0.698	-0.0370	0.469	0.469								
	(0.761)	(0.982)	(0.770)	(0.798)								
LnGOV_SP					1.541***	1.424***	1.284***	1.284***				
					(0.000)	(0.000)	(0.000)	(0.000)				
LnFIS_HLTH									26.00***	24.82***	24.30***	24.30***
									(0.000)	(0.000)	(0.000)	(0.000)

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_cons	33.49	34.66**	35.34**	35.34***	48.76**	47.90***	47.63***	47.63***	-166.0***	-156.4***	-154.2***	-154.2***
	(0.143)	(0.035)	(0.026)	(0.007)	(0.022)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	594	594	594	594	594	594	594	594	594	594	594	594
R-Squared	0.442	0.493	0.471	0.471	0.404	0.480	0.417	0.417	0.444	0.501	0.510	0.510
Adjusted R-Squared	0.431	0.468	0.424	0.424	0.395	0.430	0.411	0.411	0.436	0.494	0.473	0.473
Hausman			93.26				59.26				22.57	
F-Test	23.30	13.52	6.600	6.699	31.95	15.12	16.97	18.10	58.30	44.36	63.84	54.80

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Regression Results on Conventional Banks Overall Technical Efficiency (OTE)

	Model 7				Model 8				Model 9			
	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	0.0784***	0.0725***	0.125	0.125	0.0719***	0.0381	-0.157*	-0.157	0.0774***	0.0600**	0.0278	0.0278
	(0.000)	(0.005)	(0.105)	(0.367)	(0.000)	(0.145)	(0.058)	(0.282)	(0.000)	(0.020)	(0.717)	(0.841)
LnLLRGL	-0.0138	0.0294*	0.0345*	0.0345*	-0.0107	0.0341*	0.0375*	0.0375*	-0.0187	0.0231	0.0278	0.0278
	(0.488)	(0.084)	(0.050)	(0.080)	(0.609)	(0.073)	(0.058)	(0.065)	(0.350)	(0.182)	(0.122)	(0.138)
LnETA	0.235***	0.162**	0.164**	0.164*	0.198***	0.0510	0.0105	0.0105	0.225***	0.125*	0.112	0.112
	(0.000)	(0.015)	(0.034)	(0.088)	(0.001)	(0.477)	(0.902)	(0.925)	(0.000)	(0.063)	(0.148)	(0.254)
LnLOANSTA	-0.213***	-0.239***	-0.287***	-0.287	-0.182***	-0.153*	-0.122	-0.122	-0.203***	-0.212***	-0.237**	-0.237
	(0.000)	(0.002)	(0.006)	(0.266)	(0.001)	(0.061)	(0.291)	(0.641)	(0.000)	(0.006)	(0.025)	(0.406)
LnNIETA	-0.498***	-0.305***	0.00164	0.00164	-0.489***	-0.298***	-0.0595	-0.0595	-0.493***	-0.301***	-0.0333	-0.0333
	(0.000)	(0.000)	(0.987)	(0.991)	(0.000)	(0.000)	(0.585)	(0.705)	(0.000)	(0.000)	(0.737)	(0.828)
LnGDP	-4.123***	-3.936***	-3.763***	-3.763***	-9.448***	-8.617***	-7.990***	-7.990***	1.274	1.095**	1.048**	1.048***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.103)	(0.027)	(0.033)	(0.009)
LnINFL	0.0623***	0.0550***	0.0514***	0.0514***	0.127***	0.111***	0.0995***	0.0995***	0.0537***	0.0460***	0.0419***	0.0419***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LnBUSS_FREE	19.54***	18.39***	17.84***	17.84***								
	(0.000)	(0.000)	(0.000)	(0.000)								
LnLBR_FREE					24.38***	21.91***	20.10***	20.10***				
					(0.000)	(0.000)	(0.000)	(0.000)				
LnMONE_FREE									-10.04***	-9.282***	-8.829***	-8.829***
									(0.000)	(0.000)	(0.000)	(0.000)
_cons	19.17	20.22*	18.74	18.74**	140.6***	130.6***	124.5***	124.5***	6.462	8.919	9.464	9.464
	(0.326)	(0.099)	(0.122)	(0.035)	(0.000)	(0.000)	(0.000)	(0.000)	(0.742)	(0.475)	(0.444)	(0.308)
N	594	594	594	594	594	594	594	594	594	594	594	594
R-Squared	0.407	0.421	0.435	0.435	0.351	0.267	0.498	0.498	0.405	0.404	0.419	0.419
Adjusted R-Squared	0.399	0.354	0.426	0.426	0.342	0.386	0.477	0.477	0.397	0.366	0.406	0.406
Hausman			32.52				50.76				32.90	
F-Test	50.15	45.35	47.29	47.32	39.51	25.98	26.01	29.42	49.77	37.45	44.27	43.85

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Regression Results on Conventional Banks Overall Technical Efficiency (OTE)

	Model 10				Model 11				Model 12			
	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	0.0667***	0.0282	-0.225**	-0.225	0.0774***	0.0630**	0.0213	0.0213	0.0698***	0.0321	-0.178**	-0.178
	(0.000)	(0.292)	(0.017)	(0.186)	(0.000)	(0.014)	(0.786)	(0.878)	(0.000)	(0.233)	(0.050)	(0.278)
LnLLRGL	0.0350	0.0877***	0.0875***	0.0875***	-0.0171	0.0266	0.0332*	0.0332*	0.0238	0.0747***	0.0753***	0.0753***
	(0.114)	(0.000)	(0.000)	(0.002)	(0.397)	(0.129)	(0.071)	(0.083)	(0.271)	(0.000)	(0.000)	(0.004)
LnETA	0.127**	-0.0986	-0.199**	-0.199	0.240***	0.174**	0.165**	0.165	0.142**	-0.0765	-0.159*	-0.159
	(0.039)	(0.206)	(0.034)	(0.168)	(0.000)	(0.011)	(0.041)	(0.118)	(0.018)	(0.314)	(0.079)	(0.248)
LnLOANSTA	-0.143**	-0.101	-0.0842	-0.0842	-0.213***	-0.217***	-0.212**	-0.212	-0.152**	-0.117	-0.118	-0.118
	(0.019)	(0.249)	(0.520)	(0.735)	(0.000)	(0.005)	(0.049)	(0.386)	(0.011)	(0.174)	(0.348)	(0.661)
LnNIETA	-0.496***	-0.283***	0.0670	0.0670	-0.501***	-0.341***	-0.0951	-0.0951	-0.495***	-0.278***	0.0503	0.0503
	(0.000)	(0.000)	(0.587)	(0.727)	(0.000)	(0.000)	(0.349)	(0.510)	(0.000)	(0.000)	(0.671)	(0.789)
LnGDP	-1.549*	-1.527**	-1.473**	-1.473***	3.209***	2.904***	2.706***	2.706***	-2.808***	-2.539***	-2.353***	-2.353***
	(0.098)	(0.024)	(0.022)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
LnINFL	0.0259	0.0194	0.0140	0.0140	-0.0255	-0.0264***	-0.0263***	-0.0263***	0.0277*	0.0203*	0.0153	0.0153*
	(0.129)	(0.118)	(0.240)	(0.119)	(0.102)	(0.009)	(0.009)	(0.000)	(0.092)	(0.081)	(0.175)	(0.068)
LnTADE_FREE	0.377	1.032	1.194	1.194								
	(0.915)	(0.688)	(0.628)	(0.550)								
LnINV_FREE					-6.641***	-6.183***	-5.816***	-5.816***				
					(0.000)	(0.000)	(0.000)	(0.000)				
LnFIN_FREE									16.46***	14.25***	12.87***	12.87***

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									(0.000)	(0.000)	(0.000)	(0.000)
_cons	34.74	32.95**	34.57**	34.57***	-59.44***	-52.55***	-47.66***	-47.66***	0.669	4.501	8.668	8.668
	(0.126)	(0.045)	(0.029)	(0.006)	(0.005)	(0.000)	(0.001)	(0.000)	(0.976)	(0.776)	(0.572)	(0.512)
N	594	594	594	594	594	594	594	594	594	594	594	594
R-Squared	0.442	0.487	0.474	0.474	0.398	0.397	0.392	0.392	0.280	0.118	0.465	0.465
Adjusted R-Squared	0.431	0.470	0.456	0.456	0.390	0.385	0.380	0.380	0.270	0.280	0.442	0.442
Hausman			98.71				27.64				76.89	
F-Test	23.29	24.69	66.21	75.71	48.30	36.77	39.54	36.69	28.48	38.20	42.14	45.55

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

REGRESSION RESULTS ON CONVENTIONAL BANKS PURE TECHNICAL EFFICIENCY (PTE)

Table 8: Regression Results on Conventional Banks Pure Technical Efficiency (PTE)

	Model 13				Model 14				Model 15			
	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	0.192***	0.160***	0.0925	0.0925	0.187***	0.144***	0.0201	0.0201	0.190***	0.148***	0.0347	0.0347
	(0.000)	(0.000)	(0.104)	(0.321)	(0.000)	(0.000)	(0.794)	(0.881)	(0.000)	(0.000)	(0.641)	(0.792)
LnLLRGL	-0.0198	0.0274**	0.0366**	0.0366**	-0.00654	0.0445**	0.0466**	0.0466**	-0.0187	0.0306*	0.0341*	0.0341*
	(0.226)	(0.045)	(0.008)	(0.023)	(0.734)	(0.010)	(0.010)	(0.031)	(0.326)	(0.070)	(0.052)	(0.089)
LnETA	0.241***	0.0141	-0.0262	-0.0262	0.255***	0.0659	0.00981	0.00981	0.273***	0.106	0.0589	0.0589
	(0.000)	(0.802)	(0.673)	(0.769)	(0.000)	(0.321)	(0.899)	(0.912)	(0.000)	(0.102)	(0.433)	(0.482)
LnLOANSTA	-0.189***	-0.00566	0.124	0.124	-0.0951*	-0.0207	0.0563	0.0563	-0.104**	-0.0304	0.0489	0.0489
	(0.000)	(0.934)	(0.138)	(0.363)	(0.074)	(0.790)	(0.601)	(0.614)	(0.046)	(0.689)	(0.638)	(0.677)
LnNIETA	-0.308***	-0.0913*	0.0222	0.0222	-0.326***	-0.141**	0.0504	0.0504	-0.327***	-0.166***	-0.0125	-0.0125
	(0.000)	(0.051)	(0.704)	(0.711)	(0.000)	(0.027)	(0.619)	(0.711)	(0.000)	(0.008)	(0.899)	(0.926)
LnGDP					-1.008	-1.034**	-1.011**	-1.011***	1.153	0.832	0.680	0.680
					(0.172)	(0.035)	(0.036)	(0.002)	(0.173)	(0.132)	(0.213)	(0.158)
LnINFL					0.0180	0.0130	0.00981	0.00981	0.0242*	0.0190**	0.0158*	0.0158**
					(0.220)	(0.185)	(0.309)	(0.147)	(0.094)	(0.045)	(0.092)	(0.022)
LnOVER_FREE									-12.68***	-10.99***	-10.00***	-10.00***
									(0.000)	(0.000)	(0.000)	(0.000)
_cons	-4.148***	-2.391***	-1.242**	-1.242	22.10	24.35*	25.69**	25.69***	19.08	21.74*	23.22*	23.22***
	(0.000)	(0.000)	(0.014)	(0.120)	(0.250)	(0.057)	(0.041)	(0.004)	(0.312)	(0.077)	(0.056)	(0.008)
N	771	771	771	771	594	594	594	594	594	594	594	594
R-Squared	0.379	0.372	0.412	0.412	0.370	0.348	0.370	0.370	0.395	0.443	0.471	0.471
Adjusted R-Squared	0.374	0.351	0.408	0.408	0.368	0.332	0.364	0.364	0.387	0.420	0.462	0.462
Hausman			81.54				27.46				14.04	
F-Test	43.33	32.47	42.12	19.63	49.15	37.51	26.99	30.61	47.77	51.64	69.02	45.77

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Regression Results on Conventional Banks Pure Technical Efficiency (PTE)

	Model 16				Model 17				Model 18			
	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	0.187***	0.145***	0.0144	0.0144	0.189***	0.154***	0.0745	0.0745	0.195***	0.183***	0.244***	0.244**
	(0.000)	(0.000)	(0.853)	(0.914)	(0.000)	(0.000)	(0.327)	(0.554)	(0.000)	(0.000)	(0.000)	(0.033)
LnLLRGL	-0.00670	0.0439**	0.0458**	0.0458**	-0.0192	0.0303*	0.0353**	0.0353*	-0.0455**	-0.00244	0.00461	0.00461
	(0.729)	(0.012)	(0.011)	(0.036)	(0.316)	(0.075)	(0.047)	(0.081)	(0.014)	(0.875)	(0.775)	(0.798)
LnETA	0.255***	0.0676	0.00723	0.00723	0.282***	0.133**	0.0853	0.0853	0.338***	0.291***	0.288***	0.288***
	(0.000)	(0.309)	(0.925)	(0.936)	(0.000)	(0.043)	(0.267)	(0.331)	(0.000)	(0.000)	(0.000)	(0.001)
LnLOANSTA	-0.0949*	-0.0220	0.0591	0.0591	-0.113**	-0.0488	0.0267	0.0267	-0.148***	-0.112	-0.0681	-0.0681
	(0.075)	(0.776)	(0.583)	(0.600)	(0.032)	(0.521)	(0.799)	(0.800)	(0.003)	(0.116)	(0.472)	(0.533)
LnNIETA	-0.326***	-0.146**	0.0474	0.0474	-0.325***	-0.159**	0.0373	0.0373	-0.329***	-0.215***	-0.0462	-0.0462
	(0.000)	(0.021)	(0.640)	(0.728)	(0.000)	(0.011)	(0.706)	(0.769)	(0.000)	(0.000)	(0.603)	(0.685)
LnGDP	-1.031	-1.063**	-1.067**	-1.067***	-1.431*	-1.421***	-1.346***	-1.346***	1.054	0.822*	0.815*	0.815***
	(0.170)	(0.034)	(0.030)	(0.000)	(0.051)	(0.003)	(0.005)	(0.000)	(0.146)	(0.064)	(0.068)	(0.009)
LnINFL	0.0175	0.0125	0.00852	0.00852	0.00794	0.00511	0.00320	0.00320	0.00643	0.00471	0.00332	0.00332
	(0.243)	(0.217)	(0.387)	(0.252)	(0.586)	(0.597)	(0.736)	(0.608)	(0.640)	(0.577)	(0.694)	(0.576)

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LnTXB	0.350	0.424	0.836	0.836								
	(0.862)	(0.752)	(0.526)	(0.548)								
LnGOV_SP					0.874***	0.738***	0.643***	0.643***				
					(0.000)	(0.000)	(0.000)	(0.000)				
LnFIS_HLTH									15.85***	14.78***	14.38***	14.38***
									(0.000)	(0.000)	(0.000)	(0.000)
_cons	21.18	23.23*	23.57*	23.57**	29.72	31.31**	31.25**	31.25***	-100.6***	-89.22***	-87.19***	-87.19***
	(0.288)	(0.081)	(0.070)	(0.033)	(0.117)	(0.012)	(0.011)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
N	594	594	594	594	594	594	594	594	594	594	594	594
R-Squared	0.370	0.392	0.378	0.378	0.392	0.400	0.431	0.431	0.452	0.442	0.465	0.465
Adjusted R-Squared	0.355	0.379	0.359	0.359	0.386	0.397	0.425	0.425	0.439	0.426	0.448	0.448
Hausman		52.46				37.30				24.85		
F-Test	42.94	33.47	24.09	43.78	47.11	66.41	56.47	52.95	60.23	38.97	42.10	34.37

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Regression Results on Conventional Banks Pure Technical Efficiency (PTE)

	Model 19				Model 20				Model 21			
	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	0.194***	0.176***	0.222***	0.222*	0.190***	0.153***	0.0609	0.0609	0.193***	0.169***	0.169**	0.169
	(0.000)	(0.000)	(0.002)	(0.065)	(0.000)	(0.000)	(0.405)	(0.628)	(0.000)	(0.000)	(0.018)	(0.170)
LnLLRGL	-0.0354*	0.0102	0.0167	0.0167	-0.0333*	0.0136	0.0187	0.0187	-0.0381**	0.00619	0.0122	0.0122
	(0.059)	(0.520)	(0.315)	(0.375)	(0.082)	(0.419)	(0.284)	(0.332)	(0.042)	(0.700)	(0.464)	(0.517)
LnETA	0.319***	0.232***	0.216***	0.216***	0.296***	0.163**	0.127*	0.127	0.313***	0.211***	0.190***	0.190**
	(0.000)	(0.000)	(0.003)	(0.007)	(0.000)	(0.011)	(0.090)	(0.121)	(0.000)	(0.001)	(0.009)	(0.013)
LnLOANSTA	-0.137***	-0.0979	-0.0612	-0.0612	-0.118**	-0.0489	0.0333	0.0333	-0.131**	-0.0827	-0.0341	-0.0341
	(0.007)	(0.181)	(0.533)	(0.557)	(0.022)	(0.514)	(0.744)	(0.766)	(0.010)	(0.258)	(0.728)	(0.766)
LnNIETA	-0.327***	-0.184***	0.0157	0.0157	-0.322***	-0.169***	-0.0183	-0.0183	-0.324***	-0.181***	-0.00515	-0.00515
	(0.000)	(0.002)	(0.864)	(0.893)	(0.000)	(0.006)	(0.849)	(0.883)	(0.000)	(0.003)	(0.955)	(0.966)
LnGDP	-2.556***	-2.497***	-2.389***	-2.389***	-5.660***	-5.122***	-4.753***	-4.753***	0.630	0.411	0.375	0.375
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.389)	(0.370)	(0.412)	(0.305)
LnINFL	0.0397***	0.0345***	0.0316***	0.0316***	0.0776***	0.0655***	0.0585***	0.0585***	0.0346**	0.0295***	0.0266***	0.0266***
	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.015)	(0.001)	(0.003)	(0.000)
LnBUSS_FREE	11.56***	10.56***	10.16***	10.16***								
	(0.000)	(0.000)	(0.000)	(0.000)								
LnLBR_FREE					14.28***	12.40***	11.32***	11.32***				
					(0.000)	(0.000)	(0.000)	(0.000)				
LnMONE_FREE									-5.916***	-5.396***	-5.119***	-5.119***
									(0.000)	(0.000)	(0.000)	(0.000)
_cons	12.55	16.24	15.56	15.56*	83.77***	78.83***	75.21***	75.21***	5.098	9.567	9.996	9.996
	(0.493)	(0.156)	(0.174)	(0.061)	(0.000)	(0.000)	(0.000)	(0.000)	(0.782)	(0.406)	(0.385)	(0.251)
N	594	594	594	594	594	594	594	594	594	594	594	594
R-Squared	0.433	0.410	0.410	0.410	0.411	0.442	0.437	0.437	0.432	0.462	0.407	0.407
Adjusted R-Squared	0.421	0.408	0.407	0.407	0.405	0.425	0.431	0.431	0.427	0.441	0.382	0.382
Hausman		19.97				28.92				19.73		
F-Test	55.82	32.78	46.29	42.13	50.97	47.52	47.75	47.34	55.55	43.87	46.07	41.42

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Regression Results on Conventional Banks Pure Technical Efficiency (PTE)

	Model 22				Model 23				Model 24			
	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	0.187***	0.146***	0.0222	0.0222	0.193***	0.171***	0.170**	0.170	0.189***	0.150***	0.0531	0.0531
	(0.000)	(0.000)	(0.775)	(0.873)	(0.000)	(0.000)	(0.018)	(0.143)	(0.000)	(0.000)	(0.483)	(0.694)
LnLLRGL	-0.00668	0.0440**	0.0468***	0.0468**	-0.0387**	0.00696	0.0144	0.0144	-0.0131	0.0359**	0.0392**	0.0392*
	(0.729)	(0.011)	(0.010)	(0.029)	(0.039)	(0.664)	(0.390)	(0.426)	(0.495)	(0.035)	(0.027)	(0.066)
LnETA	0.255***	0.0708	0.00915	0.00915	0.324***	0.247***	0.227***	0.227***	0.264***	0.0878	0.0345	0.0345
	(0.000)	(0.285)	(0.906)	(0.918)	(0.000)	(0.000)	(0.002)	(0.008)	(0.000)	(0.178)	(0.648)	(0.681)
LnLOANSTA	-0.0952*	-0.0249	0.0548	0.0548	-0.139***	-0.0893	-0.0221	-0.0221	-0.100*	-0.0344	0.0326	0.0326
	(0.074)	(0.746)	(0.611)	(0.626)	(0.006)	(0.218)	(0.822)	(0.835)	(0.057)	(0.651)	(0.757)	(0.774)
LnNIETA	-0.326***	-0.151**	0.0524	0.0524	-0.329***	-0.207***	-0.0439	-0.0439	-0.325***	-0.153**	0.0426	0.0426
	(0.000)	(0.017)	(0.606)	(0.703)	(0.000)	(0.001)	(0.635)	(0.710)	(0.000)	(0.015)	(0.667)	(0.752)
LnGDP	-0.959	-1.075**	-1.070**	-1.070***	1.913**	1.549***	1.411***	1.411***	-1.777**	-1.733***	-1.653***	-1.653***

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	(0.240)	(0.049)	(0.044)	(0.000)	(0.015)	(0.002)	(0.005)	(0.000)	(0.019)	(0.001)	(0.001)	(0.000)
LnINFL	0.0177	0.0135	0.0102	0.0102	-0.0136	-0.0135	-0.0137	-0.0137***	0.0192	0.0144	0.0112	0.0112*
	(0.235)	(0.179)	(0.296)	(0.138)	(0.346)	(0.140)	(0.131)	(0.018)	(0.186)	(0.135)	(0.234)	(0.092)
LnTADE_FREE	-0.443	0.349	0.535	0.535								
	(0.886)	(0.867)	(0.792)	(0.790)								
LnINV_FREE					-4.114***	-3.719***	-3.480***	-3.480***				
					(0.000)	(0.000)	(0.000)	(0.000)				
LnFIN_FREE									9.715***	8.794***	8.178***	8.178***
									(0.000)	(0.000)	(0.000)	(0.000)
_cons	22.79	23.78*	24.81*	24.81**	-36.61*	-27.92**	-24.68**	-24.68***	1.645	5.804	7.977	7.977
	(0.250)	(0.074)	(0.057)	(0.024)	(0.062)	(0.024)	(0.048)	(0.002)	(0.934)	(0.656)	(0.534)	(0.489)
N	594	594	594	594	594	594	594	594	594	594	594	594
R-Squared	0.370	0.420	0.371	0.371	0.435	0.447	0.403	0.403	0.385	0.472	0.404	0.404
Adjusted R-Squared	0.367	0.413	0.367	0.367	0.421	0.435	0.397	0.397	0.374	0.464	0.400	0.400
F-Test	42.94	45.62	23.66	30.10	56.35	28.96	35.65	31.44	45.71	41.08	53.63	73.01

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

REGRESSION RESULTS ON CONVENTIONAL BANKS SCALE EFFICIENCY (SE)

Table 12: Regression Results on Conventional Banks Scale Efficiency (SE)

	Model 25				Model 26				Model 27			
	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	-0.118***	-0.122***	-0.234***	-0.234***	-0.120***	-0.124***	-0.250***	-0.250**	-0.119***	-0.121***	-0.245***	-0.245**
	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.047)	(0.000)	(0.000)	(0.000)	(0.049)
LnLLRGL	0.0248**	0.0253**	0.0286***	0.0286*	0.0414***	0.0461***	0.0402***	0.0402*	0.0355***	0.0405***	0.0363**	0.0363*
	(0.022)	(0.014)	(0.008)	(0.062)	(0.002)	(0.001)	(0.005)	(0.055)	(0.009)	(0.002)	(0.012)	(0.069)
LnETA	-0.116***	-0.144***	-0.142***	-0.142**	-0.127***	-0.191***	-0.208***	-0.208**	-0.119***	-0.171***	-0.192***	-0.192*
	(0.000)	(0.000)	(0.003)	(0.046)	(0.001)	(0.000)	(0.001)	(0.043)	(0.002)	(0.000)	(0.002)	(0.057)
LnLOANSTA	-0.0392	-0.0879*	-0.138**	-0.138	-0.0478	-0.0626	-0.138	-0.138	-0.0522	-0.0630	-0.140	-0.140
	(0.217)	(0.068)	(0.036)	(0.340)	(0.201)	(0.267)	(0.108)	(0.456)	(0.159)	(0.241)	(0.101)	(0.465)
LnNIETA	-0.157***	-0.0801**	-0.0359	-0.0359	-0.170***	-0.0952**	0.0126	0.0126	-0.171***	-0.116***	-0.00758	-0.00758
	(0.000)	(0.017)	(0.432)	(0.471)	(0.000)	(0.039)	(0.876)	(0.919)	(0.000)	(0.008)	(0.925)	(0.950)
LnGDP					-0.501	-0.372	-0.335	-0.335	0.534	0.355	0.208	0.208
					(0.334)	(0.335)	(0.382)	(0.180)	(0.374)	(0.437)	(0.642)	(0.547)
LnINFL					0.00760	0.00471	0.00326	0.00326	0.0106	0.00729	0.00520	0.00520
					(0.461)	(0.541)	(0.672)	(0.526)	(0.303)	(0.351)	(0.499)	(0.321)
LnOVER_FREE									-6.073***	-4.330***	-3.210**	-3.210**
									(0.001)	(0.002)	(0.021)	(0.027)
_cons	0.282*	0.644***	1.744***	1.744***	13.29	10.38	10.92	10.92	11.85	9.508	10.12	10.12
	(0.072)	(0.003)	(0.000)	(0.008)	(0.325)	(0.301)	(0.275)	(0.107)	(0.376)	(0.349)	(0.310)	(0.131)
N	771	771	771	771	594	594	594	594	594	594	594	594
R-Squared	0.372	0.426	0.432	0.432	0.468	0.401	0.405	0.405	0.482	0.492	0.515	0.515
Adjusted R-Squared	0.367	0.417	0.425	0.425	0.443	0.392	0.397	0.397	0.469	0.484	0.502	0.502
Hausman		20.01				17.89				15.30		
F-Test	57.16	12.64	30.60	2.802	30.67	17.34	42.39	23.83	28.68	34.52	49.44	42.19

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Regression Results on Conventional Banks Scale Efficiency (SE)

	Model 28				Model 29				Model 30			
	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	-0.120***	-0.122***	-0.247***	-0.247*	-0.119***	-0.117***	-0.195***	-0.117***	-0.115***	-0.102***	-0.0950*	-0.0950
	(0.000)	(0.000)	(0.000)	(0.050)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.100)	(0.430)
LnLLRGL	0.0412***	0.0464***	0.0406***	0.0406*	0.0317**	0.0331**	0.0290**	0.0331*	0.0164	0.0130	0.0113	0.0113
	(0.003)	(0.001)	(0.005)	(0.052)	(0.019)	(0.011)	(0.037)	(0.065)	(0.212)	(0.297)	(0.396)	(0.527)
LnETA	-0.128***	-0.186***	-0.206***	-0.206**	-0.107***	-0.134***	-0.132**	-0.134**	-0.0739**	-0.0456	-0.0156	-0.0156
	(0.001)	(0.000)	(0.001)	(0.045)	(0.004)	(0.006)	(0.028)	(0.039)	(0.041)	(0.342)	(0.791)	(0.847)
LnLOANSTA	-0.0475	-0.0583	-0.139	-0.139	-0.0613*	-0.0877	-0.167**	-0.0877	-0.0816**	-0.135**	-0.223***	-0.223
	(0.204)	(0.282)	(0.106)	(0.450)	(0.096)	(0.107)	(0.043)	(0.413)	(0.022)	(0.012)	(0.004)	(0.260)
LnNIETA	-0.170***	-0.108**	0.0139	0.0139	-0.169***	-0.109**	-0.000397	-0.109**	-0.172***	-0.140***	-0.0540	-0.0540
	(0.000)	(0.015)	(0.863)	(0.911)	(0.000)	(0.014)	(0.996)	(0.036)	(0.000)	(0.001)	(0.462)	(0.623)
LnGDP	-0.524	-0.356	-0.311	-0.311	-0.824	-0.724*	-0.668*	-0.724***	0.821	0.897**	0.924**	0.924***
	(0.320)	(0.372)	(0.426)	(0.205)	(0.108)	(0.054)	(0.073)	(0.003)	(0.111)	(0.014)	(0.012)	(0.001)

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LnINFL	0.00708	0.00552	0.00382	0.00382	-0.000108	-0.00259	-0.00333	-0.00259	0.000168	-0.00106	-0.00121	-0.00121
	(0.502)	(0.491)	(0.627)	(0.475)	(0.992)	(0.730)	(0.656)	(0.579)	(0.986)	(0.878)	(0.862)	(0.790)
LnTXB	0.352	-0.379	-0.364	-0.364								
	(0.803)	(0.723)	(0.729)	(0.705)								
LnGOV_SP					0.668***	0.675***	0.641***	0.675***				
					(0.000)	(0.000)	(0.000)	(0.000)				
LnFIS_HLTH									10.16***	10.04***	9.918***	9.918***
									(0.000)	(0.000)	(0.000)	(0.000)
_cons	12.37	11.54	11.84	11.84	19.12	16.73*	16.46*	16.73***	-65.33***	-66.88***	-66.92***	-66.92***
	(0.377)	(0.276)	(0.253)	(0.120)	(0.150)	(0.086)	(0.089)	(0.008)	(0.000)	(0.000)	(0.000)	(0.000)
N	594	594	594	594	594	594	594	594	594	594	594	594
R-Squared	0.468	0.442	0.505	0.505	0.498	0.468	0.524	0.482	0.547	0.474	0.544	0.544
Adjusted R-Squared	0.451	0.424	0.489	0.489	0.475	0.449	0.513	0.468	0.513	0.459	0.531	0.531
Hausman			18.63				11.39				17.11	
F-Test	26.80	30.06	72.11	63.02	31.08	51.98	62.90	55.64	38.88	39.46	41.97	76.69

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 14: Regression Results on Conventional Banks Scale Efficiency (SE)

	Model 31				Model 32				Model 33			
	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	-0.115***	-0.104***	-0.0971*	-0.0971	-0.118***	-0.118***	-0.218***	-0.218*	-0.116***	-0.109***	-0.141**	-0.141
	(0.000)	(0.000)	(0.096)	(0.425)	(0.000)	(0.000)	(0.000)	(0.068)	(0.000)	(0.000)	(0.015)	(0.239)
LnLLRGL	0.0215	0.0197	0.0177	0.0177	0.0224*	0.0223*	0.0186	0.0186	0.0193	0.0177	0.0154	0.0154
	(0.103)	(0.115)	(0.187)	(0.333)	(0.095)	(0.087)	(0.183)	(0.328)	(0.143)	(0.163)	(0.257)	(0.393)
LnETA	-0.0834**	-0.0739	-0.0519	-0.0519	-0.0982***	-0.121**	-0.116*	-0.116	-0.0872**	-0.0908*	-0.0771	-0.0771
	(0.022)	(0.123)	(0.376)	(0.536)	(0.008)	(0.013)	(0.052)	(0.177)	(0.016)	(0.057)	(0.188)	(0.370)
LnLOANSTA	-0.0765**	-0.128**	-0.227***	-0.227	-0.0642*	-0.0908*	-0.156*	-0.156	-0.0726**	-0.115**	-0.203**	-0.203
	(0.033)	(0.018)	(0.004)	(0.251)	(0.077)	(0.098)	(0.056)	(0.424)	(0.042)	(0.033)	(0.011)	(0.327)
LnNIETA	-0.171***	-0.125***	-0.0136	-0.0136	-0.167***	-0.113**	-0.0407	-0.0407	-0.169***	-0.122***	-0.0276	-0.0276
	(0.000)	(0.005)	(0.854)	(0.905)	(0.000)	(0.012)	(0.596)	(0.715)	(0.000)	(0.005)	(0.711)	(0.806)
LnGDP	-1.570***	-1.446***	-1.377***	-1.377***	-3.793***	-3.461***	-3.242***	-3.242***	0.641	0.675*	0.671*	0.671**
	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.212)	(0.067)	(0.071)	(0.012)
LnINFL	0.0226**	0.0205***	0.0198***	0.0198***	0.0497***	0.0444***	0.0411***	0.0411***	0.0191*	0.0165**	0.0154**	0.0154**
	(0.024)	(0.004)	(0.007)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.054)	(0.021)	(0.033)	(0.005)
LnBUSS_FREE	7.982***	7.810***	7.680***	7.680***								
	(0.000)	(0.000)	(0.000)	(0.000)								
LnLBR_FREE					10.11***	9.391***	8.790***	8.790***				
					(0.000)	(0.000)	(0.000)	(0.000)				
LnMONE_FREE									-4.126***	-3.887***	-3.712***	-3.712***
									(0.000)	(0.000)	(0.000)	(0.000)
_cons	6.692	4.241	3.257	3.257	56.93***	51.51***	49.39***	49.39***	1.432	-0.396	-0.463	-0.463
	(0.603)	(0.642)	(0.723)	(0.597)	(0.000)	(0.000)	(0.000)	(0.000)	(0.912)	(0.966)	(0.960)	(0.941)
N	594	594	594	594	594	594	594	594	594	594	594	594
R-Squared	0.339	0.410	0.450	0.450	0.416	0.461	0.493	0.493	0.439	0.412	0.436	0.436
Adjusted R-Squared	32.4	0.402	0.442	0.442	0.399	0.453	0.472	0.472	0.423	0.401	0.419	0.419
Hausman			46.81				39.46				49.12	
F-Test	37.47	33.91	20.42	88.89	33.82	38.46	44.72	57.27	37.48	41.67	18.99	69.15

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 15: Regression Results on Conventional Banks Scale Efficiency (SE)

	Model 34				Model 35				Model 36			
	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE	POLS	RE	FE	Robust-FE
LnTA	-0.120***	-0.124***	-0.247***	-0.247*	-0.116***	-0.109***	-0.149**	-0.149	-0.119***	-0.121***	-0.231***	-0.231*
	(0.000)	(0.000)	(0.000)	(0.051)	(0.000)	(0.000)	(0.012)	(0.215)	(0.000)	(0.000)	(0.000)	(0.065)
LnLLRGL	0.0416***	0.0464***	0.0405***	0.0405*	0.0216	0.0207	0.0186	0.0186	0.0368***	0.0409***	0.0360**	0.0360*
	(0.002)	(0.001)	(0.005)	(0.055)	(0.105)	(0.106)	(0.175)	(0.317)	(0.006)	(0.002)	(0.012)	(0.074)
LnETA	-0.128***	-0.192***	-0.208***	-0.208**	-0.0847**	-0.0784	-0.0619	-0.0619	-0.121***	-0.177***	-0.193***	-0.193*
	(0.001)	(0.000)	(0.001)	(0.043)	(0.021)	(0.108)	(0.304)	(0.457)	(0.001)	(0.000)	(0.002)	(0.058)
LnLOANSTA	-0.0477	-0.0627	-0.139	-0.139	-0.0744**	-0.115**	-0.190**	-0.190	-0.0514	-0.0676	-0.151*	-0.151
	(0.202)	(0.265)	(0.105)	(0.452)	(0.039)	(0.035)	(0.018)	(0.314)	(0.165)	(0.217)	(0.075)	(0.440)
LnNIETA	-0.170***	-	0.0151	0.0151	-0.172***	-0.132***	-0.0507	-0.0507	-0.169***	-0.105**	0.00817	0.00817

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		0.0954**										
	(0.000)	(0.038)	(0.852)	(0.904)	(0.000)	(0.003)	(0.505)	(0.648)	(0.000)	(0.018)	(0.918)	(0.947)
LnGDP	-0.593	-0.459	-0.407	-0.407	1.293**	1.338***	1.292***	1.292***	-1.035*	-0.808**	-0.703*	-0.703**
	(0.301)	(0.282)	(0.335)	(0.170)	(0.021)	(0.001)	(0.002)	(0.000)	(0.053)	(0.043)	(0.075)	(0.012)
LnINFL	0.00824	0.00532	0.00375	0.00375	-0.0118	-0.0129*	-0.0125*	-0.0125**	0.00845	0.00560	0.00408	0.00408
	(0.431)	(0.497)	(0.630)	(0.487)	(0.250)	(0.082)	(0.093)	(0.013)	(0.408)	(0.465)	(0.591)	(0.422)
LnTADE_FREE	0.822	0.781	0.661	0.661								
	(0.705)	(0.630)	(0.683)	(0.644)								
LnINV_FREE					-2.526***	-2.450***	-2.336***	-2.336***				
					(0.000)	(0.000)	(0.000)	(0.000)				
LnFIN_FREE									6.745***	5.444***	4.690***	4.690***
									(0.000)	(0.000)	(0.001)	(0.003)
_cons	12.02	9.163	9.829	9.829	-22.76	-24.20**	-22.90**	-22.90***	-0.912	-1.017	0.758	0.758
	(0.388)	(0.377)	(0.343)	(0.173)	(0.102)	(0.016)	(0.025)	(0.002)	(0.948)	(0.922)	(0.942)	(0.919)
N	594	594	594	594	594	594	594	594	594	594	594	594
R-Squared	0.468	0.474	0.505	0.505	0.426	0.463	0.415	0.415	0.485	0.423	0.426	0.426
Adjusted R-Squared	0.451	0.461	0.485	0.485	0.411	0.451	0.403	0.403	0.475	0.410	0.409	0.409
Hausman			43.27				39.62				40.51	
F-Test	26.82	33.71	72.18	21.01	35.39	37.93	46.78	69.42	29.12	37.11	48.34	27.35

p-values in parentheses
Source: own calculations
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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GENERALIZED METHOD OF MOMENTS (GMM RESULTS)

Table 16: GMM Results for Overall Technical Efficiency (OTE)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
L.LNOTE	0.774***	1.045***	1.016***	1.041***	1.029***	0.822***	0.867***	0.979***	0.858***	0.992***	0.818***	0.861***
	[0.05]	[0.07]	[0.06]	[0.07]	[0.09]	[0.06]	[0.06]	[0.06]	[0.05]	[0.08]	[0.06]	[0.06]
LnTA	-0.030	-0.020	0.011	-0.005	-0.015	0.026	0.013	0.000	0.028	-0.017	0.029	0.040*
	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.03]	[0.03]	[0.03]	[0.02]	[0.04]	[0.03]	[0.02]
LnLLRGL	0.109***	0.160***	0.134***	0.132***	0.178***	0.059*	0.091***	0.099***	0.047	0.159***	0.054	0.056
	[0.03]	[0.04]	[0.04]	[0.04]	[0.04]	[0.03]	[0.03]	[0.04]	[0.03]	[0.04]	[0.03]	[0.04]
LnETA	-0.203	-0.369**	-0.306*	-0.371**	-0.364*	0.053	-0.066	-0.168	0.033	-0.341*	0.066	0.007
	[0.14]	[0.18]	[0.18]	[0.18]	[0.19]	[0.13]	[0.12]	[0.13]	[0.13]	[0.20]	[0.13]	[0.14]
LnLOANSTA	-0.061	0.033	0.006	0.052	0.057	-0.049	-0.028	0.026	-0.054	0.029	-0.053	-0.060
	[0.18]	[0.13]	[0.13]	[0.11]	[0.14]	[0.10]	[0.10]	[0.09]	[0.09]	[0.14]	[0.10]	[0.10]
LnNIETA	-0.135	0.012	0.001	0.033	-0.050	-0.194**	-0.154*	-0.066	-0.151*	-0.026	-0.196**	-0.142
	[0.08]	[0.12]	[0.11]	[0.11]	[0.12]	[0.08]	[0.08]	[0.09]	[0.08]	[0.13]	[0.08]	[0.09]
LnGDP		-0.489	2.364***	-0.442	-1.114**	0.823**	-2.609***	-7.794***	2.217***	-1.303**	2.429***	-0.851**
		[0.48]	[0.61]	[0.48]	[0.51]	[0.39]	[0.47]	[0.91]	[0.41]	[0.53]	[0.44]	[0.38]
LnINFL		-0.036**	-0.034***	-0.061***	-0.035**	-0.046***	0.005	0.046***	-0.004	0.004	-0.108***	-0.019*
		[0.01]	[0.01]	[0.01]	[0.02]	[0.01]	[0.01]	[0.01]	[0.01]	[0.02]	[0.01]	[0.01]
LnOVER_FREE			-17.717***									
			[2.52]									
LnTXB				12.338***								
				[2.18]								
LnGOV_SP					0.739***							
					[0.19]							
LnFIS_HLTH						23.216***						
						[2.03]						
LnBUSS_FREE							14.398***					
							[1.58]					
LnLBR_FREE								20.134***				
								[2.13]				
LnMONE_FREE									-8.525***			
									[0.72]			
LnTADE_FREE										23.863***		
										[5.71]		
LnINV_FREE											-9.373***	
											[0.78]	
LnFIN_FREE												38.147***
												[3.26]

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Constant	-0.138	13.673	13.425	-40.851**	26.880**	-123.441***	5.276	119.279***	-21.705**	-71.898***	-24.542**	-137.883***
	[0.75]	[12.78]	[11.24]	[16.00]	[13.22]	[15.14]	[9.68]	[16.59]	[9.68]	[22.71]	[10.05]	[15.81]
Observations	681	504	504	504	504	504	504	504	504	504	504	504
No. of instruments	83	84	85	85	85	85	85	85	85	85	85	85
No. of groups	95	94	94	94	94	94	94	94	94	94	94	94
Arellano-Bond: AR(1)	0.001	0.001	0.004	0.001	0.000	0.001	0.002	0.000	0.000	0.001	0.001	0.000
Arellano-Bond: AR(2)	0.053	0.565	0.390	0.927	0.442	0.754	0.564	0.896	0.859	0.947	0.885	0.762
Hansen test (p-val)	0.212	0.145	0.121	0.182	0.159	0.172	0.166	0.151	0.173	0.157	0.181	0.148

Standard errors in brackets
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 17: GMM Results for Pure Technical Efficiency (PTE)

	Model 13	Model 14	Model 15	Model 16	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
L.LNPTE	0.912***	0.999***	1.015***	1.036***	1.055***	0.928***	0.956***	0.976***	0.936***	1.006***	0.923***	0.922***
	[0.09]	[0.06]	[0.13]	[0.14]	[0.13]	[0.07]	[0.07]	[0.07]	[0.08]	[0.07]	[0.07]	[0.07]
LnTA	0.039	0.088**	0.054	0.045	0.059	0.104***	0.095**	0.095**	0.104***	0.082**	0.105***	0.109***
	[0.03]	[0.04]	[0.05]	[0.05]	[0.05]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]
LnLLRGL	0.039	0.094**	0.076**	0.079**	0.090**	0.067*	0.080**	0.090**	0.070*	0.098**	0.065*	0.059
	[0.03]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]
LnETA	-0.074	-0.069	-0.046	-0.071	-0.116	0.066	0.014	-0.046	0.040	-0.087	0.073	0.050
	[0.12]	[0.15]	[0.14]	[0.15]	[0.11]	[0.18]	[0.17]	[0.16]	[0.17]	[0.15]	[0.19]	[0.16]
LnLOANSTA	0.004	0.003	-0.019	-0.009	0.029	-0.026	-0.013	0.006	-0.018	0.014	-0.028	-0.016
	[0.11]	[0.09]	[0.10]	[0.12]	[0.12]	[0.09]	[0.09]	[0.09]	[0.09]	[0.09]	[0.09]	[0.09]
LnNIETA	-0.113*	-0.013	-0.068	-0.046	-0.040	-0.073	-0.058	-0.026	-0.058	-0.016	-0.074	-0.054
	[0.07]	[0.10]	[0.10]	[0.10]	[0.09]	[0.10]	[0.10]	[0.10]	[0.10]	[0.09]	[0.10]	[0.09]
LnGDP		-0.511	0.095	-0.544	-0.470	-0.111	-1.167***	-1.961**	0.218	-0.973**	0.402	-0.523
		[0.36]	[0.59]	[0.38]	[0.47]	[0.36]	[0.42]	[1.00]	[0.46]	[0.42]	[0.45]	[0.32]
LnINFL		-0.015*	-0.015**	-0.016*	-0.013	-0.020***	-0.005	0.000	-0.007	0.006	-0.039***	-0.009
		[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.02]	[0.01]	[0.01]	[0.01]	[0.01]
LnOVER_FREE			-4.196*									
			[2.29]									
LnTXB				1.237								
				[1.73]								
LnGOV_SP					0.044							
					[0.12]							
LnFIS_HLTH						7.127***						
						[2.22]						

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LnBUSS_FREE							4.214***					
							[1.41]					
LnLBR_FREE								3.890				
								[2.71]				
LnMONE_FREE									-2.334**			
									[0.96]			
LnTADE_FREE										13.231***		
										[3.42]		
LnINV_FREE											-2.900***	
											[0.91]	
LnFIN_FREE												12.110***
												[4.27]
Constant	-0.706	12.559	14.459	8.365	11.644	-29.439*	11.122	34.009**	3.181	-34.360***	0.480	-38.185*
	[0.69]	[9.42]	[10.03]	[14.28]	[12.23]	[16.34]	[9.17]	[15.69]	[9.59]	[11.67]	[9.68]	[21.28]
Observations	681	504	504	504	504	504	504	504	504	504	504	504
No. of instruments	83	84	85	85	85	85	85	85	85	85	85	85
No. of groups	95	94	94	94	94	94	94	94	94	94	94	94
Arellano-Bond: AR(1)	0.017	0.046	0.047	0.047	0.041	0.042	0.043	0.040	0.044	0.042	0.041	0.046
Arellano-Bond: AR(2)	0.118	0.313	0.312	0.312	0.306	0.344	0.352	0.351	0.355	0.310	0.341	0.316
Hansen test (p-val)	0.406	0.339	0.104	0.108	0.209	0.296	0.295	0.245	0.278	0.458	0.302	0.367

Standard errors in brackets
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 18: GMM Results for Scale Efficiency (SE)

	Model 25	Model 26	Model 27	Model 28	Model 29	Model 30	Model 31	Model 32	Model 33	Model 34	Model 35	Model 36
L.LNSE	0.455***	0.547***	0.758***	0.776***	0.587***	0.712***	0.656***	0.806***	0.776***	0.615***	0.724***	0.793***
	[0.08]	[0.09]	[0.11]	[0.12]	[0.11]	[0.12]	[0.11]	[0.10]	[0.11]	[0.12]	[0.12]	[0.10]
LnTA	-0.122***	-0.192***	-0.122***	-0.121***	-0.141***	-0.107***	-0.121***	-0.108***	-0.101***	-0.151***	-0.104***	-0.097***
	[0.03]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.04]	[0.03]	[0.03]	[0.03]	[0.04]	[0.03]
LnLLRGL	0.053**	0.063*	0.026	0.022	0.033	-0.010	0.010	-0.023	-0.030	0.032	-0.015	-0.025
	[0.02]	[0.04]	[0.03]	[0.03]	[0.05]	[0.05]	[0.04]	[0.05]	[0.04]	[0.05]	[0.05]	[0.04]
LnETA	-0.247**	-0.537***	-0.220	-0.235**	-0.274**	-0.062	-0.120	-0.169	-0.071	-0.305**	-0.052	-0.066
	[0.10]	[0.11]	[0.16]	[0.11]	[0.12]	[0.14]	[0.12]	[0.13]	[0.11]	[0.13]	[0.13]	[0.11]
LnLOANSTA	-0.088	-0.065	0.015	0.037	0.035	-0.087	-0.060	-0.004	-0.058	0.035	-0.090	-0.061
	[0.14]	[0.18]	[0.12]	[0.08]	[0.10]	[0.10]	[0.11]	[0.08]	[0.09]	[0.10]	[0.10]	[0.10]
LnNIETA	-0.071	0.047	-0.119*	-0.087	-0.115	-0.143**	-0.145**	-0.047	-0.099*	-0.126	-0.138**	-0.101*
	[0.08]	[0.11]	[0.07]	[0.09]	[0.09]	[0.07]	[0.06]	[0.09]	[0.06]	[0.10]	[0.06]	[0.06]
LnGDP		-0.155	1.605***	0.005	-0.747**	0.788**	-1.370***	-5.792***	1.728***	-0.496	1.775***	-0.155

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		[0.36]	[0.55]	[0.37]	[0.33]	[0.35]	[0.41]	[0.83]	[0.48]	[0.40]	[0.44]	[0.34]
LnINFL		-0.009	-0.009	-0.028***	-0.008	-0.022***	0.011	0.045***	0.003	0.014*	-0.061***	-0.007
		[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
LnOVER_FREE			-10.359***									
			[2.21]									
LnTXB				8.459***								
				[1.86]								
LnGOV_SP					0.668***							
					[0.11]							
LnFIS_HLTH						14.265***						
						[2.41]						
LnBUSS_FREE							9.017***					
							[1.39]					
LnLBR_FREE								15.638***				
								[2.41]				
LnMONE_FREE									-5.530***			
									[0.85]			
LnTADE_FREE										13.694***		
										[3.51]		
LnINV_FREE											-5.800***	
											[0.95]	
LnFIN_FREE												22.788***
												[4.30]
Constant	1.080**	6.832	2.705	-35.550**	18.133**	-82.012***	-2.504	86.837***	-20.371**	-46.892***	-21.055**	-90.425***
	[0.47]	[9.34]	[9.15]	[14.33]	[8.61]	[16.60]	[8.67]	[13.14]	[10.23]	[12.54]	[9.35]	[19.11]
Observations	681	504	504	504	504	504	504	504	504	504	504	504
No. of instruments	83	85	85	85	85	85	85	85	85	85	85	85
No. of groups	95	94	94	94	94	94	94	94	94	94	94	94
Arellano-Bond: AR(1)	0.001	0.003	0.010	0.037	0.031	0.037	0.013	0.032	0.034	0.032	0.035	0.013
Arellano-Bond: AR(2)	0.230	0.387	0.528	0.379	0.299	0.325	0.352	0.285	0.280	0.403	0.315	0.327
Hansen test (p-val)	0.232	0.075	0.182	0.207	0.272	0.146	0.128	0.197	0.163	0.295	0.154	0.215

Standard errors in brackets
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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