# Chapter 3
# The Impact of Central Bank Policy Rate on Financial Development: The Case of Europe


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**Abstract** This study investigates the influence of central bank policy rate (CBPR) on financial development for a panel of fifteen European Union economies, utilizing annual data ranging from 2002 to 2017 inclusively. To this aim, an autoregressive distributive lag model was applied and Pooled Mean Group estimates were obtained. Economic growth, innovation, globalization index, and corruption perception index were incorporated within the empirical model as control variables to refrain from omitted variable bias. Our findings indicate that CBPR is a major driver of financial development alongside reduced corruption, increased economic growth, and increased globalization in the case of Europe. Based on the empirical findings we have obtained, we offer various policy recommendations such as; following the monetary policy which will support financial development, ensuring the central bank's independence, increasing trust in institutions, combating the informal economy, and encouraging innovations, especially in the financial sector. We discuss the policy implications of our findings in the conclusion section in more detail.

**Key words** Financial development · Central bank policy rate · Corruption · Innovation · ARDL-PMG

## 3.1 Introduction

The significance of financial development on a broad set of macroeconomic fundamentals, most notably economic growth (Calderón & Liu, 2003; Pradhan et al., 2018), has been predominately emphasized within the existing literature. The establishment of extensive literature devoted to the importance of financial development

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has resulted in the construction of research that investigates the determinants of financial development. Although a wide range of potential determinants, such as inflation (Rousseau & Yilmazkuday, 2009), interest rates (Roubini & Sala-i-Martin, 1992; Odhiambo, 2009), human capital (Calderón & Liu, 2003), and liquidity (Pagano, 1993; Alfaro et al., 2004), have been examined to see their effect on financial development, central bank policy rate (CBPR) has been overlooked thus far. Our study aims to fulfill this gap by inspecting the role of the CBPR on financial development for the case of the top fifteen European Union countries in terms of their nominal GDP.

Institutions are responsible for the completion of financial sector activities and the implementation of procedures and regulations that advocate financial sector advancement (Beck et al., 2010); hence, they are essential for financial development. As the central bank is one of the most influential financial institutions, a central banking measure has been frequently incorporated within financial development studies (King & Levine, 1993; Neyapti, 2003; Tayssir & Feryel, 2018). Although many central bank institutional characteristics have been used to investigate their contribution to financial development, the role of monetary policy has been less elaborated. Monetary policy tools used to stabilize prices have consequences on the activities carried out by financial institutions, thus affecting financial development progression. The CBPR is the rate utilized by the central bank to signal or implement its' monetary policy stance (IMF, 2019). Tayssir and Feryel (2018) argued that central banks use the CBPR to supply banks with short-term loans and banks take the CBPR as a reference point to set the offered credit rates to customers. Thereby, the CBPR enables central banks to control loan amounts and rates of the banking system, which can affect financial development. For the abovementioned reason, there is a need to test the relationship between CBPR and financial development.

In order to refrain from committing omitted variable bias, we opt to include control variables largely reflected within the existing literature devoted to analyzing the determinants of financial development. The most widely repeating control variable is economic growth within financial development literature. In his early study, Robinson (1979) suggested that a greater economic growth level increases the request for financial services and hence supports financial development. There is an abundance of findings on the causal relationship between economic growth and financial development. The existing literature stresses both a bidirectional (King & Levine, 1993; Hsueh et al., 2013; Pradhan et al., 2018) and a unidirectional (Zang & Kim, 2007) causal relationship between economic growth and financial development. Given the extensive evidence to support a significant positive impact of economic growth on financial development (Kar et al., 2011; Hsueh et al., 2013; Pradhan et al., 2018), an economic growth proxy in the form of the logarithm of gross domestic product (GDP) is integrated within our model.

The effect of globalization has also been considered when investigating financial development. Studies have found that globalization contributes to trade liberalization, reduces transactional cost (Daisaka et al., 2014), brings forth institutional reform advancement (Mishkin, 2009), and advances the demand for financial goods and services, resulting in greater financial deepening and financial development. Law et al. (2014) found that globalization Granger causes financial

development. Asongu (2014) suggested globalization forms financial liberalization, heightening financial development, in the case of Africa. Due to findings, which document the positive effect of globalization on financial development, a globalization measure—in the form of globalization index—is added to our model.

Especially recent research found evidence for the positive contribution of innovation to financial development (Pradhan et al., 2018; Zhu et al., 2020). Hsu et al. (2014) found innovation to be vital for the equity market and, therefore, financial development. Xiao and Zhao (2012) included an innovation measure when analyzing financial development from a banking perspective. They found innovation vital for increasing the inflow of resources, thus resulting in enhanced financial development. In this light, we incorporated an innovation measure in the form of research and development expenditure proportion of GDP within our empirical model. Corruption, considered to be an institutional quality proxy, has also been investigated as a hindering factor for financial development. Muye and Muye (2017) incorporated a corruption measure of institutional quality to analyze the causal relationship between globalization, institutions, and financial development. Naceur et al. (2014) indicated that corruption hinders financial development for MENA countries. This finding was also supported by Gazdar and Cherif (2015). Compatible with our interests, we find it fitting to incorporate corruption as an institutional quality measure within our model to prevent omitted variable bias. Following Gazdar and Cherif (2015) and Muye and Muye (2017), we chose to incorporate a corruption proxy in the form of a corruption perception index.

Our study analyzes the effect of CBPR on financial development for a panel of top 15 European Union countries according to nominal GDP (Austria, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Spain, Sweden, and United Kingdom). Due to data limitation, three countries were not included, namely, Belgium, Greece, and Romania. We considered the top 15 European Union countries as our sample given that they have financial system structures that are of a similar trait and share the same set of rules and regulations in terms of the monetary and fiscal policy framework; thus, we omit any possible sample bias by focusing on cross-sections that share similar characteristics. Our data set consists of annual observations for sixteen years spanning from 2002 to 2017 due to data availability. To investigate the determinants of financial development, we used the autoregressive distributive lag (ARDL) model (Pesaran et al., 1999), given the fact that the variables utilized within the model are of mixed integration order. The finding of our study provides important information that helps derive crucial policy implications necessary for improving financial development further within the European region.

## 3.2 Literature Review

Although many financial development studies have given importance primarily to macroeconomic variables, institutional measures have increasingly been given attention following Fry (1997), who argued that institutional features play a pivotal

role in financial liberalization practices implemented on financial development. Institutional quality has been attributed to providing lucrative financial reforms (Acemoglu & Johnson, 2005). Institutional factors include a wide range of aspects such as legal origin (Beck et al., 2001), regulatory aspects, political conditions, bureaucracy, possible civil anarchy, governmental fundaments, political factors, democracy, taxation, and tax reformation (Fry, 1997). There is abundant evidence to show that institutional factors matter for financial development. For example, evidence suggests political instability diminishes financial development as investment opportunities are swindled (Roe & Siegel, 2011).

Financial institutions have a vital role in financial development. King and Levine (1993) extended the work of Schumpeter (1911) on financial intermediation by investigating the importance of financial institutions for both financial development and economic growth; for 80 countries. They found that central banks play a pivotal role in expanding financial depth, as the credits they provide to private firms enhance capital allocation efficiency. Due to the early supportive evidence and theoretical support that central banks have implications on the creation of financial development, studies started to elaborate on which central banking components matter the most in boosting financial development.

The literature devoted to investigating possible determinants of financial development has often incorporated some form of central bank measure. Most commonly, a central bank independence proxy is included within financial development models. Neyapti (2001) analyzed the role of independence of the central bank in the promotion of financial development for the case of Europe and found that it improves price stability and assists the maintenance of monetary policy fundamentals required to drive financial development. In continuation of this work, Neyapti (2003) found greater central bank independence brings forth heightened financial market development. The central bank assets variable is another frequently used central banking measure by researchers (Beck et al., 2010). Tayssir and Feryel (2018) explored how central bank aspects can influence financial development for various countries; by accounting for central banks' political role, transparency, inflation targeting, and monetary tools. Their findings indicate that central banking conditions can support financial sector development.

The existing literature on financial development emphasizes the importance of how monetary policies can expand financial development further. Past research has concluded that monetary policies and financial stability are closely linked (Yellen, 2014). Koenig (2013) reports that the close link between financial stability and monetary policy is crucial for price stability to mitigate risks associated with price volatility. Studies have also shown that financial intermediates are responsible for the creation of money and how this liquidity implicates monetary transmissions (Beck & Colciago, 2014). Research devoted to improving monetary targets in order to revamp the financial system notes that transparency is vital (Broaddus Jr, 2002). Ennis and Keister (2008) suggest it's of great importance to implement monetary policy efficiently. Thus, the literature supports the notion that monetary policies may affect financial development, as monetary tools strengthen financial market integration. Based on this information, we assess the potential impact of central banks' guiding the banking system through the CBPR on financial development for the

European region. Many important aspects of central banks have been incorporated when analyzing their role in driving financial development, and the role of the CBPR has been overlooked thus far.

## 3.3 Data

### *3.3.1 Definition of Data*

This study utilizes a panel dataset of fifteen cross-sections (Austria, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Spain, Sweden, and United Kingdom), with a time span of 16 years ranging from 2002 to 2017 due to data availability. All of the data is of an annual frequency. Financial development, denoted as FD, the dependent variable within our model, is proxied by the financial development index sourced from the International Monetary Fund (IMF). The study's main contribution is to analyze the impact of CBPR on financial development for Europe; this measure was gathered from the Bank for International Settlements (BIS). Control variables, consistent with the existing literature, are incorporated into the model to refrain from committing omitted variable bias. Such variables include: corruption perception index, denoted as LCT as a measure of institutional quality in which a larger observation implies less corruption—supplied by Transparency International, innovation denoted as INN, measured as a proportion of GDP spent on research and development sourced from Worldbank database; globalization index, denoted as GI, collected from Swiss Economic Institute (KOF); and Gross Domestic Product (GDP), obtained from Worldbank database, in logarithmic form denoted by LGDP. We expect all the regressors to exhort a positive impact on FD in the case of Europe.

### *3.3.2 Descriptive Statistics*

Descriptive statistics, displayed in Table 3.1, indicate that we have a strongly balanced panel. The number of observations is the same, 240, for all variables utilized within the study; thus, there is no missing observation. The mean, standard deviation, minimum, and maximum observations imply that the data don't suffer from any outliers/extreme values.

Table 3.2 reports the pairwise correlations between the regressand and all regressors of the model. The table provides evidence that no multicollinearity exists as all of the explanatory variables are correlated to a degree less than 0.80.

**Table 3.1** Descriptive statistics

| Variable | Obs | Mean | Std. dev. | Min | Max |
|---|---|---|---|---|---|
| FD | 240 | 0.68 | 0.15 | 0.30 | 0.94 |
| CBPR | 240 | 1.91 | 2.03 | −0.75 | 12.50 |
| LCT | 240 | 1.93 | 0.26 | 1.22 | 2.27 |
| INN | 240 | 1.91 | 0.86 | 0.54 | 3.91 |
| GI | 240 | 85.13 | 3.58 | 71.20 | 91.30 |
| LGDP | 240 | 27.14 | 1.05 | 25.48 | 28.99 |

Source: Authors' analysis of data

**Table 3.2** Correlation matrix

| Variables | CBPR | CT | INN | GI | GDP |
|---|---|---|---|---|---|
| CBPR | 1.00 | | | | |
| CT | −0.27 | 1.00 | | | |
| INN | −0.35 | 0.73 | 1.00 | | |
| GI | −0.37 | 0.76 | 0.71 | 1.00 | |
| GDP | −0.24 | 0.12 | 0.55 | 0.19 | 1.00 |

Source: Authors' analysis of data

### *3.3.3 Unit Root Test Results*

To check the integration order of variables used to construct the model, variables are investigated with the application of three different panel unit root tests, namely, Im et al. (2003), Breitung (1999), and Maddala and Wu (1999) Fisher ADF test, and the results are reported in Table 3.3. The results concerning the unit root tests are as follows: according to all three tests, the dependent variable (FD) is stationary at the first difference—I(1); majority of the tests imply that CBPR is stationary at level—I (0); LCT, INN, GI, and LGDP series are I(1) according to the majority of the results. Having stationary and nonstationary variables in the model makes the ARDL the most plausible estimation technique (Pesaran & Smith, 1995) to analyze cointegrating relationships. In addition, unit root tests confirm that none of our variables employed are I(2), which is a necessary condition to employ the ARDL method.

## 3.4 Econometric Method and Empirical Findings

### *3.4.1 Model and Methodology*

This study investigates the link between financial development and CBPR in the case of Europe, while controlling for the impact of innovation, economic growth, globalization, and corruption. This model can be expressed by the following linear equation:

**Table 3.3** Panel unit root test results

| Level | FD | CBPR | LCT | INN | GI | LGDP |
|---|---|---|---|---|---|---|
| $\tau_{T\ \text{fisher ADF}}$ | 36.23 | 89.76* | 42.82*** | 33.64 | 49.90** | 35.19 |
| $\tau_{\mu\ \text{fisher ADF}}$ | 45.58** | 14.45 | 45.83** | 22.18 | 39.04 | 19.64 |
| $\tau_{\ \text{fisher ADF}}$ | 15.63 | 54.68* | 30.02 | 8.88 | 1.16 | 2.14 |
| $\tau_{T\ \text{IPS}}$ | −1.31*** | −5.92* | −1.15 | −0.72 | −2.29** | 1.10 |
| $\tau_{\mu\ \text{IPS}}$ | −1.91** | 1.03 | −1.21 | 1.18 | −0.74 | 0.91 |
| $\tau_{T\ \text{BREITUNG}}$ | −0.12 | −5.89* | −0.16 | −1.61*** | −1.68** | −3.49* |
| First difference | | | | | | |
| $\tau_{T\ \text{fisher ADF}}$ | 50.73** | 88.09* | 51.51* | 37.07 | 70.23* | 35.00 |
| $\tau_{\mu\ \text{fisher ADF}}$ | 76.59* | 132.80* | 80.70* | 61.46* | 107.23* | 63.97* |
| $\tau_{\ \text{fisher ADF}}$ | 144.88* | 188.49* | 133.62* | 89.86* | 123.80* | 82.98* |
| $\tau_{T\ \text{IPS}}$ | −2.50* | −5.76* | −2.53* | −1.17 | −4.21* | −0.94 |
| $\tau_{\mu\ \text{IPS}}$ | −4.86* | −9.05* | −5.15* | −3.55* | −7.19* | −3.87* |
| $\tau_{T\ \text{BREITUNG}}$ | −6.46* | −10.78* | −1.90** | −2.05** | −4.47* | −4.90* |

Source: Authors' analysis of data
Note: ***$p$-value < 0.10; **$p$-value < 0.05; *$p$-value < 0.01

$$\begin{aligned} \text{FD}_{it} = &\beta_{0it} + \beta_{1it}\text{CBPR}_{it} + \beta_{2it}\text{LCT}_{it} + \beta_{3it}\text{INN}_{it} \\ &+ \beta_{4it}\text{GI}_{it} + \beta_{5it}\text{LGDP}_{it} + \varepsilon_{it} \end{aligned} \tag{3.1}$$

where $i$ is the cross-sectional unit and $t$ is the time element.

Our study focuses on investigating both the short- and long-run relationships between financial development and CBPR. Thus, conventional static panel estimations such as pooled OLS, fixed effects, and random effects are not applicable given that they are unable to distinguish between short- and long-run dynamics. Moreover, such estimations are only applicable to stationary variables, I(0). Since variables used within our model are of mixed integration order such estimations would provide spurious results. Likewise, panel cointegration methods such as Pedroni (1999) and Johansen-Fisher test), which requires all variables to be integrated in order of one, I(1), are not suitable given the dataset utilized within our study. The panel ARDL procedure is considered to be efficient and consistent within small samples (Haug, 2002). Thus, the empirical investigation is carried out with the use of the panel ARDL estimation framework, established by Pesaran et al. (1999), to analyze the short- and long-run relationships among the variables.

The ARDL model specification can be displayed as follows:

$$\Delta FD_{i,t} = \delta_i + \beta_{1i} FD_{i,t-1} + \beta_{2i} CBPR_{i,t} + \beta_{3i} LCT_{i,t} + \beta_{4i} INN_{i,t} + \beta_{5i} GI_{i,t} + \beta_{6i} LGDP_{i,t} + \sum_{i=1}^{p-1} \alpha_{1i} \Delta FD_{i,t-i} + \sum_{i=0}^{q-1} \alpha_{2i} \Delta CBPR_{i,t-i} + \sum_{i=0}^{q} \alpha_{3i} \Delta LCT_{i,t-i} + \sum_{i=0}^{q} \alpha_{4i} \Delta INN_{i,t-i} + \sum_{i=0}^{q} \alpha_{5i} \Delta GI_{i,t-i} + \sum_{i=0}^{q} \alpha_{6i} \Delta LGDP_{i,t-i} + \varepsilon_{i,t} \quad (3.2)$$

Where $\Delta$ is the difference operator, $\beta_1$ is error correction coefficient, $\alpha_1$ *to* $\alpha_6$ are the short-run coefficients of the variables, while $\beta_2$ to $\beta_6$ indicate the long-run coefficients of the equation. $\delta_i$ is the constant and $\varepsilon_{it}$ is the residual term. Cross-sectional and time dimensions are subscribed by *i* and *t,* respectively.

The optimal lag specification order chosen using Akaike Information Criterion (AIC) was (2, 1, 1, 1, 1, 1) for financial development, CBPR, corruption, innovation, globalization, and LGDP, respectively.

The presence of a significant and negative error correction term (ECT), −0.796, suggests that any short-run deviations from the equilibrium amongst the regressand and regressors will converge back to the long-run equilibrium in the future. ARDL pooled mean group (PMG) estimation (Pesaran et al., 1999) was conducted, which is applied in the case of heterogeneous panels. PMG allows intercepts, short-run coefficients, and error variances to vary across groups, providing average long-run coefficients for all groups within the sample, which is practical when the long-run relationships are expected to be similar for each cross-section.

### *3.4.2 Empirical Findings*

The short- and long-run coefficients obtained from the PMG estimator are reported in Table 3.4. The long-run ARDL coefficients indicate the following: The coefficient of CBPR is positive and highly significant, suggesting that this variable is a long-run driver of financial development for the case of European countries. This might happen due to several channels. First, a higher CBPR rate is expected to cause an increase in deposits. Higher deposits will increase the capacity of banks in terms of providing funds and causes a deepening of financial markets. Moreover, Tayssir and Feryel (2018) mentioned that lower interest rates are associated with restricted financial markets and lower financial development. Moreover, the primary target of a central bank is price stability. Higher CBPR helps the monetary authority reach its primary target, which may support a well-functioning financial system and, ultimately financial development. Previously, researchers investigated several central bank features on financial development and found that improving the efficiency of regulations and instruments applied by the central bank would have a positive

**Table 3.4** Pooled mean group ARDL estimation results

| D.FD | Coefficient | Std. err. | t-statistic |
|---|---|---|---|
| Long-run coefficients | | | |
| L.CBPR | 0.017* | 0.001 | 10.171 |
| L.LCT | 0.059** | 0.025 | 2.384 |
| L.INN. | 0.044* | 0.014 | 3.087 |
| GI | 0.007* | 0.002 | 2.675 |
| LGDP | 0.035 | 0.034 | 1.032 |
| Short-run coefficients | | | |
| ECT | −0.796* | 0.094 | −8.437 |
| Dl.FD | 0.067 | 0.112 | 0.599 |
| D1.CBPR | 0.005 | 0.006 | 0.800 |
| D1.LCT | 0.036 | 0.097 | 0.375 |
| D1.INN | −0.009 | 0.061 | −0.142 |
| D1.GI | −0.003 | 0.005 | −0.719 |
| D1.LGDP | −0.076 | 0.283 | −0.269 |
| Constant | −0.816* | 0.100 | −8.147 |
| Trend | −0.002** | 0.001 | −1.979 |

Source: Authors' analysis of data
Note: ***$p$-value < 0.10; **$p$-value < 0.05; *$p$-value < 0.01

effect (King & Levine, 1993; Beck et al., 2000; Tayssir & Feryel, 2018). Our study contributes to the literature by providing evidence for another aspect of the central bank which might support financial development.

Corruption has a positive significant coefficient, implying reduced corruption also enhances financial development within Europe in the long run (based on the measure used, a positive association is desired). This finding is supported by the existing literature (Muye & Muye, 2017), suggesting less corruption diminishes the number of informal economy activities, which will boost the use of financial instruments provided by financial intermediates, thus heightening financial development further. The innovation coefficient is positive and highly significant. This finding implies that spurs in innovation contribute to financial development for the panel of countries we investigated. Literature provides strong evidence on the positive relationship between innovation and financial performance of companies (Govindarajan & Kopalle, 2006; Jansen et al., 2006; Walker, 2004). Increased financial performance offers extra income that companies tend to invest, which will boost financial development. The notion that innovation enhances financial development is also supported by previous studies (Ang & Kumar, 2014; Belazreg & Mtar, 2020).

Likewise, the coefficient of globalization variable is positive and highly significant, indicating that globalization positively contributes to financial development within Europe as a more borderless marketplace creates an ideal environment for investment opportunities to thrive; this result is in line with that of Mishkin (2009) and Muye and Muye (2017). Economic growth is found to be insignificant; therefore, it does not provide any evidence that supports the hypothesized relationship between economic growth and financial development, for the case of Europe in the

long run. This result is compatible with the findings of Hsueh et al. (2013), where they found weak to no evidence on causality from economic growth to financial development. They claimed that financial development does not depend on economic growth but is enhanced by other indicators.

The error correction term is negative and highly significant. This finding indicates any short-run disequilibrium experienced is corrected within the long run. All short-run coefficients provided by ARDL are found to be insignificant; this suggests changes in any variable are unable to impact European financial development within the short run. Thus, said changes/adaptions will only be reflected by the European financial development in the long run.

## 3.5 Conclusion

Thus far, the financial development literature has overlooked how CBPR may affect the progression of financial development. Hence, to fulfill the mentioned gap, this study analyzes the short- and the long-run outcomes of CBPR on financial development enhancements for a panel of fifteen European Union countries from 2002 to 2017 inclusively due to data availability. To refrain from committing omitted variable bias, innovation, economic growth, globalization, and corruption were used as control variables. PMG estimators provide us with the long- and short-run cointegrating coefficients and error correction term. Obtained findings indicate that an increase in CBPR results in greater financial development for countries within the European region which is compatible with our a priori theoretical expectations. Results concerning control variables, in regards to long-run coefficients, are harmonious with that of the existing literature and indicate that a reduction in corruption perceptions, enhancements in globalization, and innovation induce greater financial development.

Based on our findings, we propose several policy implications. Matching the CBPR with the needs of the banking sector and the financial market would improve financial development, as it is a strong monetary policy tool. A higher CBPR rate is expected to result in more deposits in the banking system. If commercial banks can provide an integrated platform with multiple investment tools to link financial markets with the banking system and give depositors access to broader options, that will enhance financial development. Financial development is just one of many variables that corruption negatively affects. Therefore, fighting corruption is vital to building a sound financial infrastructure and contributing to financial development. Although there is a wide range of potential measures to mitigate corruption, increasing trust in institutions is particularly important (Sööt & Rootalu, 2012). In this context, reducing the informal economic activities by increasing the transparency of institutions; especially the transparency of the central bank; will be helpful (De Simone et al., 2017; Lopez, 2017). Globalization increases financial integration, which will result in higher resistance to possible shocks. This will ultimately help improve the financial system. To benefit from globalization, it is crucial to reduce

trade barriers (Peters, 2017), increase technological innovation (Naz & Ahmad, 2018), provide better education (Sahlberg, 2004), and create a healthy macroeconomic environment. The promotion of innovation is considered to be a driving force behind financial development. Thus, advancements in financial reforms (Aksoy, 2019) and support in technological innovation (Maradana et al., 2017), especially financial technology, are crucial for fostering financial development as they will result in a more efficient allocation of financial resources (Pradhan et al., 2016).

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