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ARTICLE

The Combined Effects of Public and Private Investments on Economic Growth in the CEMAC Zone

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ABSTRACT

This study evaluates the simultaneous impact of public and private investments on economic growth in the CEMAC zone between 1984 and 2017. To attain this aim, we use the Vector Error Correction Model (VECM) to test the direction of causality between the three variables above at the level of each country. We find that the direction of causality is not the same in all the countries both in the short as in long-run. We then develop an ideal model going from the Cobb Douglas production function which we quantitatively validate using panel data estimation through the method of Pool Mean Group which takes into account individual specificities. It arises that contrary to economic theory, private sector investments have positive and significant effects in short-run. However, the impact of public investments is negative and significant. In the long-run, the effects are reversed and call on the authorities of the CEMAC zone to reinforce the political risk to strengthen the public-private partnership in the process of sustainable growth.

1. Introduction

The analysis of the effects of public expenditure on private sector investments and growth is not new in economics and has been the subject of many controversies. It has been the subject of a lively debate between the classical, neo-classical and Keynesian economists. According to Keynes, the State budget is one of the decision variables having a significant effect on the economic growth of a country. In fact, during periods of recession, the government can increase government investment expenditure which is an important component of aggregate demand. Consequently, there will be an increase in the aggregate demand which will stimulate the activity of the private sector and growth through a multiplier effect. On the other hand, the classical and neo-classic economists believe that all measures to boost the economy through an increase in government spending is financed by the domestic debt and crowds out private sector investment. The fact that the governments borrow on the internal market increases interest rates and leads to a fall in consumption and private sector investment. This will have as a result, a reduction in real economic growth.

Some recent studies highlight the effect of public spending composition on economic growth. Among others, we have Olulu and al. [62], Fouopi and al. [34,35], Bayraktar and Moreno-Dodson [14], Obad and Jamal [60], Dikeogu and al. [26], Iheanacho [46], Moussavou [56], Ashwani and Sheera [7], Siefu and al. [74], and Kouassi [53]. Other research shows the indirect effect of public investment...
on economic growth using private investment: Foye [36] in Nigeria showed that public investment is motivation of private investment growth. Dreger and Reimers [30] have studied the crowd in effect of public investment on private investment in the euro area, and indicated that the lack of public investment may have restricted private investment and thus GDP growth in the euro area. Canh and Phong [21] use PVAR model combined with GMM to assess the impact of public investment on private investment and economic growth based on data from 22 economic industries over a 27-year period (1990-2016). The findings show that public investment affects private investment as well as has a spillover effect on GDP across most industries with varying effects cyclically and over time.

In Central Africa as shown in Figure 1, the real GDP growth rate of 1.1% in 2017 to 2.2% in 2018, below the average rate of Africa (3.5%). Despite this improvement in 2018, growth in Central African countries remains well below the 5% recorded between 2011 and 2013. Indeed, the rise in raw material exports and agricultural production has favored public investments in infrastructure, fueling growth. The good performance of Cameroon, the Central Africa Republic and the Democratic Republic of Congo in 2018 offset the recession in Equatorial Guinea. In Cameroon, the region’s second largest economy, real GDP growth was estimated at 3.8% in 2018, compared to 3.5% in 2017. The security and humanitarian crises and the current socio-political crisis in the North-West regions and southwest did not allow the government to sustain the pace of growth. The Central African Republic’s economy continued to recover after a slowdown due to the socio-political and institutional crisis. Real GDP growth, estimated at 4.3% in 2018 compared to 4% in 2017, was supported by the construction and public works sector, despite a difficult and volatile security situation. In the Democratic Republic of Congo, the region’s largest economy accounting for one-third of regional GDP, the growth rate reached 4% in 2018, compared to 3.7% in 2017 and 1.7% in 2016.

Figure 1. Real GDP growth in Central Africa, by country, 2008-2020

Source: African Development Bank statistics [7]

Figure 2 below shows that the share of public spending in nominal GDP in Central Africa also decreased from 14% in 2016 to 12% in 2018. This is due to the decline in public investment, often interrupted in full swing when, for example, the fall in oil prices imposes a reorientation of public spending. The 2018 rate is also below the average for all of Africa (14%). In fact, the share of public expenditure in GDP in 2018 varied from 7% in the Democratic Republic of Congo to 24% in Congo. Gross fixed capital formation accounted for 22% of GDP in 2018, compared with 31% in 2015, mainly due to lower mining investments. In addition, security constraints have dampened investment and hindered private entrepreneurship. In 2018, investments contributed 0.7 point to real GDP growth, up from 1.6 points in 2017.

Figure 2. Contributions to real GDP growth in Central Africa on the demand side, by country, 2014-2018


Public investment in infrastructures and services has spillover effects on the private sector and supports an inclusive growth. However, it can also be subjected to political interests likely to reduce its efficiency. Badly conceived, under-financed, delayed or badly executed public investment projects have little impact on real economic activity. This is a major challenge for many developing countries, particularly for Central African countries. Certain countries do not have a capacity of absorption to carry out their limited investment budget while others do not have a portfolio of “ready to launch” projects which can be used to stimulate the economy [67]. In this context, the question of the productivity of public capital is the topic of a lively debate. The crucial role that can be played by a well conceived and efficiently implemented infrastructural investments by contributing to reduce the lack of access to services and support the potential increase in the GDP is emphasized by Bom and Ligthart [17], and Calderón and al. [20]. What are the combined effects of government capital

1 See Sturm, Kuper and De Hann [75] and Romp and De Hann [79] for an in-depth analysis of the available literature.
expenditure and private sector investments on growth in the CEMAC zone? Within the framework of this study, we have as objective to analyze the combined effects of government capital expenditure and private sector investments on growth in the CEMAC zone while taking into account the nature of institutions. Helpman and Grossman [43] highlights the incentive role of a favorable institutional environment in the research activities: The State that produces property rights supports the innovation through the introduction of mechanisms of re-appropriation of private returns. Moreover, the model retained by the World Bank [77] for the estimation of the determinants of growth in developing countries is an effort to integrate quantitative and qualitative factors in order not to neglect the set of variables likely to influence economic growth.

From the limited theoretical and empirical literature on this subject, we can deduce that the effect of government capital expenditure on growth depends on the institutional specificities of the zone and its level of growth, which are positively determined by the level of government investment spending and private sector investments.

2. Empirical Studies of the Relationship between Government Capital Expenditure, Private Sector Investments and Economic Growth

The relationship between these three aggregates enables us to subdivide the studies in the field in two groups. The first group highlights the role of public investment in promoting private investment and economic growth and the second makes an effort to integrate the quality of institutions into the assessment of the impact of the public investment on growth.

Firstly, Yang [78] undertook a comparative empirical study on the relationship between public and private investment on economic growth for the USA and Japan. Using the Generalized Method of Moments (GMM) for the Japanese economic data and the Ordinary Least Squares (OLS) for the USA data, both public and private investment were found to be important to the Japanese economic growth process. However, for the USA economy, private investment contributed more to economic growth than does public investment. Samake [72] in the Benin economic examined the relationship between public and private investment in economic growth process. By using a VAR framework with spanning data from 1965 to 2005, the author reported that both public and private investment were important in the Beninian economic growth process. Evidence of public investment crowding in effect on private investment was also reported. Aubyn and Afon-

so [8] assessed the macroeconomic returns of public and private investment using the VAR framework for a sample of European countries, adding Japan, Canada and the United States. Their empirical results showed that while both public and private investment positively affect output for the economies reviewed, the complementarity effect of public investment on private investment varied across countries.

Phetsavong and Ichihashi [66] examined the impact of public and private investment on economic growth for the sample of 15 developing Asian economies. Using the panel data from 1984 to 2009, private domestic investment had the higher contribution to economic growth than public investment. In the Bangladesh economy, Hague [41] evaluated the effect of public and private investment on economic growth. The empirical results implied that private investment was reported to be more significant than public investment in the economic growth process both in the short and in the long run.

Suhendra and Anwar [76] studied the effect of private investment and public investment in Indonesia GDP from 1990-2011 using Ordinary Least Square (OLS). They found out that government investment, economic growth, credit available for private investment, and the exchange rate have a positive and significant impact on private investment while interest rates and inflation have a negative and significant impact on private investment. The higher the interest rate and inflation, the lower private investment. Nevertheless, Hussein and Benhin [44] used Co-integration and Error Correction Models (ECM) to identify the effect of public and private investment in economic development process of Iraq based on a neoclassical growth framework covered the period from 1970 to 2010. They concluded that in the long run, private investment, public investment, growth in the labor force and growth in oil revenues affect real Gross Domestic Product (GDP) positively and statistically significant.

According to Imoisi, Abuo and Sogule [47], they investigated the impact of domestic investment on economic growth in Nigeria from 1970 to 2013. Using co-integration and error correction mechanism techniques, their result indicate that private investment has positive but, insignificant impact on economic growth. The study shows that private domestic investment and government productive expenditure influenced economic growth positively, but was not significant for the period of study. Meanwhile, Getachew [37] analyzed the impact of investment on economic growth in Ethiopia adopting the new neo-classical growth model of Cobb Douglas Production Function and Error Correction Model (ECM) estimation technic. He used macroeconomic data for Ethiopia from 1981 to
2011 period and concluded that there exist a short-run and long-run relationship between investment and economic growth in Ethiopia. Osman [63] applied the Auto-Regressive Distributed Lag (ARDL) model as an approach to co-integration on annual time series data from 1974-2012 to investigate the relationship between private sector credit and economic growth in Saudi Arabia. The study found that there is a long-run relationship between private sector credit and economic growth.

In the second category of studies, we find the work of Dabla-Norris and al. [25], FMI [31], Rajaram et al. [67]. According to Dabla-Norris et al. [25], to improve the impact of public investment on development, it is necessary to reinforce the institutions responsible for the management of public investments. In their study, they decompose the total index of management of public investments (PIMI - Public Investment Management Index) into sub-indices to evaluate the performance of certain institutional characteristics of 71 countries between 2007 and 2010 in four stages: identification, selection, execution and the evaluation of the projects. The scores obtained vary on a scale of 1 (weak performance) to 4 (high performance).

A more efficient public investment can stimulate growth through various channels [33]: (a) reduction of transaction costs for the private sector; (b) increases the marginal productivity of the private physical and human capital; (c) an increase in budgetary space thanks to low cost infrastructural services of better quality; (d) mobilization of resources for recurring expenditures which boosts growth.

Rajaram et al. [67] identify several institutional characteristics which countries should have for public investment to have a positive effect on growth. These include: (a) the setting-up of a transparent and responsible system to direct, examine, evaluate and select projects which will favor inclusive growth; and (b) the setting-up of mechanisms and procedures aimed at implementing, adjusting and evaluating projects in order to optimize the performance of public services.

The case studies above show that the empirical evidence on the relationship between public investment, private sector investment and growth in developing countries remains ambiguous. Moreover, few studies specifically analyze the simultaneous effects of government capital spending and private sector investments on economic growth by taking into account the political risk as the explanatory variable.

3. Methodology and Data

Our analysis is inspired by the model of Romer [69] which is reproduced by Barro and Sala-i-Martín [15]. From this last model, Borenztein, De Gregorio and Lee (1998) as well as Kofi [52] develop an endogenous growth model which is adapted to the characteristics of developing countries. This model supposes that the economy produces only one consumer good appears in the form of the following production function:

\[ Y_t = A H_t^\alpha K_t^{1-\alpha} = AH_t^\alpha K_t^\beta \]  

(1)

with \( \beta = 1 - \alpha \)

Where \( Y \) represents production, \( K \) physical capital, \( H \) human capital, and \( A \) the state of the external environment. Human capital is considered as given. Physical capital \( K \) is considered as an aggregate of various capital goods whose increase leads to the accumulation of capital. The state of the environment \( (A) \) considered here integrates various political and control variables which affect the level of productivity in the economy. These include the rate of inflation, financial development, taxation, quality of institutions, etc.

This model thus has the specificity of being able to integrate public capital as a component of physical capital and take into account institutional indicators as elements of the external environment.

Within the framework of this study, we suppose that physical capital \( K \) includes both government capital expenditure and private investment

\[ \log(K_t) = \rho \log(IPUB_t) + q \log(IPRI_t) \]

The gross secondary school enrolment is used as proxy of human capital. The inciting factors \( (A_t) \) are composed of the rate of inflation, the degree of openness of the economy \( (OUV) \), the quality of institutions measured by the variable political risk and the foreign exchange rate \( (TCH) \).

Human capital \( (KHU) \) is approximated by the gross rate of secondary enrolment. We can thus write:

\[ Y_u = KHU_u IPUB_u^{\beta_1} IPRI_u^{\beta_2} TCH_u^{\beta_3} OUV_u^{\beta_4} \]

(2)

\[ IDE_u^{\beta_5} RP_u^{\beta_6} INF_u^{\beta_7} \]

By log-linear form and after transformation, we obtain:

\[ LY_{it} = \delta_0 + \delta_1 KHU_{it} + \delta_2 IPUB_{it} + \delta_3 IPRI_{it} + \delta_4 TCH_{it} + \delta_5 OUV_{it} \]

(3)

By simplifying the expression, we write:

1 This requires a reinforcement of project evaluation policies taking into account uncertainty, the integration of the system of awarding public contracts in the implementation of projects, and the management of decisions on public private partnerships (PPP).
The level of openness (LOUV) measured by the ratio of the sum of exports and imports relative to the GDP (Berthelemy and Varoudakis, 1998) which has two aspects: trade openness (freedom of movement of goods and services) and financial openness (absence of controls on the movement of capital).

(2) Inflation (LINFL) measured by the consumer price index and enables the taking into account of the effect of the trend of prices on the purchasing power of residents and its effect on the size of the market.

(3) The real exchange rate (LTCR) shows the competitiveness of the domestic economy and is supposed to have a favorable effect on economic growth since it is likely to start-up the dynamics of internal supply, thus increasing the capacity of the economy to meet foreign demand.

(4) Credit to the economy (LCE): This is measured by net internal credit that is the sum of loans granted to the public non-financial sector and the private sector as well as other accounts. This definition is drawn from the International Financial Statistics of the IMF (1999).

(5) Human capital (LKHU) expresses the quality of labor is measured by the gross secondary enrolment rate. An increase in the active population having at least a secondary level of schooling is supposed to affect economic growth positively in line with the results obtained by the main theorists of endogenous growth [54,69].

(6) The private sector investment (LPRD) is a growth factor for both neo-classical and the Keynesian theorists. It is measured by the formation of fixed assets by the private sector.

(7) Public investment (LIPUB) can be used as an instrument of revival of growth in periods of recession according to the Keynesians. It is approximated by the formation of fixed assets by the public sector.

(8) Foreign direct investment (LFDI) measures the attractiveness of the country to foreign investors. If FDI results in the raising of capital in the market of the host country, then we witness a redistribution of capital from labor intensive industries towards capital-intensive industries, thus creating a job loss and consequently a drop in export prices and a deterioration of the terms of trade of the host country [71].

(9) The index of political risk (LRP) is an institutional indicator which varies from 0 to 100 and is composed of 12 factors, namely: government stability, socio-economic conditions, investment profile, internal and external conflicts, corruption, the implication of soldiers in politics, religious tensions, the respect of laws and regulations, ethnic tensions, the control of democracy and the quality of bureaucracy. This indicator is built going from a weighting of scores evolving from 0 to 12 points according to the risk factors considered. The arithmetic total of the scores on the various factors constitutes the perception of the level or index of political risk of the country.

From the PMG (Pool Mean Group) formulation, it is possible to jointly consider the model in the short and long-run. Moreover, there will be no difficulty to take into account stationary variables, 1 (0), and 1 (1) or cointegrated variables simultaneously [65]. It should be emphasized that the values of p and q, which indicate the number of lags to be used in the model are determined by the Schwarz Information Criterion (SIC).

By taking into account the spatial (i) and time dimension (t), we obtain:

\[ \Delta \log Y_{it} = \phi_{01} + \phi_{12} + \phi_{13} + \phi_{14} + \phi_{15} + \phi_{16} + \phi_{17} + \phi_{18} + \phi_1 + \varepsilon_{it} + \varepsilon_{it} \]

In this equation, \( \theta_0 \) to \( \theta_9 \) represent the short run dynamics while \( \theta_0 \) to \( \theta_9 \) represent the long run dynamics. \( \varepsilon \) is the coefficient of error correction between the short and long run. The error term \( \varepsilon_{it} = \varepsilon + \pi + \phi \varepsilon_t \), where \( \varepsilon \) denotes a constant term during the period and depending only on individual \( i \), \( \pi \) is a term depending only on the period \( t \), and \( \phi \varepsilon_t \) is a cross random term. The data used in this study is from secondary sources and comes primarily from World Development Indicator (WDI, 2017). However, the data on human capital (KHU) is from the African Development Bank [2] and the variable “political risk” is calculated using data drawn from International Country Risk Guide [45]. The “L” placed before the variables represent natural logarithm.

4. Estimation Results and Interpretation

4.1 Descriptive Analysis of the Variables

Before carrying out the PMG estimation, an analysis of the descriptive statistics of the variables is necessary. As shown in table 2 below, there are no significant differences between the mean and median of the various observations. This supposes that the distributions are approximately normal. This result is confirmed by the fact that the Jacque-Bera statistics are significantly high for the majority at the 5% level.

It is also noticed there that only the foreign direct investments have a mean relatively higher than that of the...
other explanatory variables of the model, followed by the private sector investments and the public investment expenditure. This explains why these variables are positively related to the growth rate. The matrix of correlation of the variables shows that the variables public capital expenditure, private sector investments, and political risk are negatively correlated with real growth as shown in table 3 below. Moreover, the degree of correlation between the variables is not very high, which dismisses any hypothesis of multi-collinearity.

4.2 Specification Test

This consists in testing the hypothesis according to which the panel is homogeneous. From the results below, we can reject the hypothesis of homogeneity since the probability of the Fisher statistic is lower than 5% (0.0000 < 0.05). Thus the panel is heterogeneous.

Test of homogeneity
- H0: homogeneous model
- H1: heterogeneous model

If P-value< 0.05, then the null hypothesis is rejected

4.3 Stationarity Tests

From table 4, we can see that two orders of stationarity are retained. While certain variables like LIPUB, LIPRI, LOUV, LPIB, LTCH are I (0), others like LIDE, LINF, LRP, LKHU are I (1). This brings us to perform the test of cointegration of Pedroni (2004) and Kao [48] to detect the existence of a possible long run relationship between these variables.

4.4 Cointegration Test Based on the VECM

The test of Pedroni shows that six statistical variables out of eleven are significant at the 5% level. This confirms the

### Table 2. Descriptive statistics of the variables

<table>
<thead>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>LPIBr</td>
<td>9.03</td>
<td>7.85</td>
<td>27.4</td>
<td>2.31</td>
<td>3.95</td>
<td>1.51</td>
<td>7.94</td>
<td>23.4</td>
<td>0.00</td>
<td>1734.0</td>
<td>2981.7</td>
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<tr>
<td>LIPUB</td>
<td>5.59</td>
<td>4.29</td>
<td>25.5</td>
<td>1.12</td>
<td>5.21</td>
<td>2.93</td>
<td>10.2</td>
<td>66.5</td>
<td>0.00</td>
<td>1074.3</td>
<td>5185.0</td>
</tr>
<tr>
<td>LIDE</td>
<td>17.2</td>
<td>17.3</td>
<td>21.7</td>
<td>9.90</td>
<td>2.21</td>
<td>-0.68</td>
<td>3.56</td>
<td>17.5</td>
<td>0.00</td>
<td>3294.8</td>
<td>934.03</td>
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<tr>
<td>LINF</td>
<td>4.17</td>
<td>4.17</td>
<td>4.86</td>
<td>2.95</td>
<td>0.39</td>
<td>-0.38</td>
<td>2.63</td>
<td>5.69</td>
<td>0.05</td>
<td>801.5</td>
<td>295.45</td>
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<td>LOUV</td>
<td>2.75</td>
<td>2.02</td>
<td>17.5</td>
<td>0.2</td>
<td>2.54</td>
<td>3.23</td>
<td>18.6</td>
<td>29.8</td>
<td>0.00</td>
<td>528.26</td>
<td>1236.5</td>
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<tr>
<td>LIPRI</td>
<td>6.75</td>
<td>5.61</td>
<td>27.76</td>
<td>1.028</td>
<td>6.04</td>
<td>2.44</td>
<td>8.05</td>
<td>35.7</td>
<td>0.00</td>
<td>1297.73</td>
<td>6969.86</td>
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<tr>
<td>LRP</td>
<td>4.13</td>
<td>4.23</td>
<td>5.5</td>
<td>1.61</td>
<td>0.86</td>
<td>-0.62</td>
<td>2.79</td>
<td>12.7</td>
<td>0.00</td>
<td>792.72</td>
<td>140.53</td>
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<tr>
<td>LKHU</td>
<td>3.09</td>
<td>3.14</td>
<td>4.28</td>
<td>0.64</td>
<td>0.735</td>
<td>-0.73</td>
<td>3.65</td>
<td>20.53</td>
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<td>577.78</td>
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<td>LTCH</td>
<td>5.30</td>
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<td>1.47</td>
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<td>97.68</td>
<td>0.00</td>
<td>1018.03</td>
<td>487.85</td>
</tr>
</tbody>
</table>

Note: Med.: Median; Max: maximum; Min: minimum
Source: Authors using “Eviews9”

### Table 3. Correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>LPIBr</th>
<th>LIPRI</th>
<th>LIPUB</th>
<th>LINF</th>
<th>LTCH</th>
<th>LIDE</th>
<th>LOUV</th>
<th>LKHU</th>
<th>LRP</th>
</tr>
</thead>
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<td>LPIBr</td>
<td>1.0000</td>
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<td></td>
<td></td>
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<tr>
<td>LIPRI</td>
<td>0.5914</td>
<td>1.0000</td>
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</tr>
<tr>
<td>LIPUB</td>
<td>0.5601</td>
<td>0.8868</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LINF</td>
<td>-0.066</td>
<td>-0.2513</td>
<td>-0.158</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTCH</td>
<td>-0.465</td>
<td>-0.1502</td>
<td>-0.053</td>
<td>0.2124</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIDE</td>
<td>0.1047</td>
<td>-0.0391</td>
<td>-0.141</td>
<td>0.4525</td>
<td>-0.064</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOUV</td>
<td>-0.275</td>
<td>-0.0348</td>
<td>-0.059</td>
<td>-0.103</td>
<td>0.0018</td>
<td>-0.001</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LKHU</td>
<td>-0.068</td>
<td>-0.1095</td>
<td>-0.293</td>
<td>0.2324</td>
<td>-0.086</td>
<td>0.5694</td>
<td>0.0055</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>LRP</td>
<td>-0.276</td>
<td>0.0895</td>
<td>-0.038</td>
<td>0.1724</td>
<td>-0.217</td>
<td>0.4928</td>
<td>-0.081</td>
<td>0.6469</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

Source: Authors using “Eviews9”

<table>
<thead>
<tr>
<th>Fisher</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>79.257</td>
<td>0.00000</td>
</tr>
</tbody>
</table>

Source: Authors using “Eviews9”
existence of a cointegration relationship. This result is also confirmed by the test of Kao. Its statistics are lower than the 1% critical value. The results are summarized in table 5 below and show that we can proceed to the estimation.

Before carrying out the PMG (Pool Mean Group) estimation itself, we should first have an idea of the causal relationship which could exist between real GDP, public investment and private investment.

4.5 Causality Test Based on the VECM

Using the approach of Odhiambo and al. [61] and Akpan and Akpan [4], we adopt the vector error correction model (VECM) of each equation 6 to 8 below to test the causal relationship between public investments, private sector investments and growth. Unlike the conventional approach to causality of Granger, this method, besides integrating the error correction term which indicates if there is cointegration also makes it possible to simultaneously test short and long run causality. Having undertaken this analysis at the level of each country, we use the following formulation of the VECM:

\[
\Delta PIB_t = \delta_1 + \sum_{i=2}^{5} \Delta PIB_{t-i} + \sum_{i=2}^{5} \Delta PIB_{t+i} + \delta ECT_t + \epsilon_t \\
\Delta PIR_t = \delta_2 + \sum_{i=2}^{5} \Delta PIR_{t-i} + \sum_{i=2}^{5} \Delta PIR_{t+i} + \delta ECT_t + \epsilon_t \\
\Delta PUB_t = \delta_3 + \sum_{i=2}^{5} \Delta PUB_{t-i} + \sum_{i=2}^{5} \Delta PUB_{t+i} + \delta ECT_t + \epsilon_t
\]

Where ECT is error correction term, all the other variables areas defined before.

Long run causality is based on the significance of the coefficient of the error correction term. In this case, the di-

<table>
<thead>
<tr>
<th>Variables</th>
<th>In levels</th>
<th>Decision</th>
<th>In first difference</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IPS</td>
<td>LLC</td>
<td></td>
<td>IPS</td>
</tr>
<tr>
<td>LIPUB</td>
<td>0.0000</td>
<td>0.0000</td>
<td>Yes ***</td>
<td>0.0000</td>
</tr>
<tr>
<td>LIDE</td>
<td>0.1211</td>
<td>0.0141</td>
<td>No</td>
<td>0.0000</td>
</tr>
<tr>
<td>LINF</td>
<td>0.9680</td>
<td>0.2590</td>
<td>No</td>
<td>0.0000</td>
</tr>
<tr>
<td>LIPRI</td>
<td>0.0000</td>
<td>0.0000</td>
<td>Yes ***</td>
<td>0.0000</td>
</tr>
<tr>
<td>LOUV</td>
<td>0.0276</td>
<td>0.0490</td>
<td>Yes **</td>
<td>0.0000</td>
</tr>
<tr>
<td>LPB</td>
<td>0.0000</td>
<td>0.0000</td>
<td>Yes ***</td>
<td>0.0000</td>
</tr>
<tr>
<td>LRP</td>
<td>0.3841</td>
<td>0.3751</td>
<td>No</td>
<td>0.0000</td>
</tr>
<tr>
<td>LKHU</td>
<td>0.2635</td>
<td>0.0222</td>
<td>No</td>
<td>0.0000</td>
</tr>
<tr>
<td>LTCH</td>
<td>0.0124</td>
<td>0.0114</td>
<td>Yes **</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Note: ***, **, * represent significance at the 1%, 5% and 10% levels
Source: Authors using “Eviews9”

Table 5. Test of stationarity of variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>In levels</th>
<th>Decision</th>
<th>In first difference</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPS</td>
<td>0.0000</td>
<td>0.0000</td>
<td>Yes ***</td>
<td>0.0000</td>
</tr>
<tr>
<td>LLC</td>
<td>0.0000</td>
<td>0.0000</td>
<td>Yes ***</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Authors using “Eviews9”

Table 5. Test of cointegration of Pedroni (2004) and Kao [48] on the combined effects of the government capital expenditure and private sector investments on growth

<table>
<thead>
<tr>
<th>Variables</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPIB</td>
<td>0.7464</td>
</tr>
<tr>
<td>LIPUB</td>
<td>0.8555</td>
</tr>
<tr>
<td>LIPRI</td>
<td>0.0151</td>
</tr>
<tr>
<td>LTCH</td>
<td>0.0782</td>
</tr>
<tr>
<td>LOUV</td>
<td>0.9037</td>
</tr>
<tr>
<td>LIDE</td>
<td>0.9072</td>
</tr>
<tr>
<td>LRP</td>
<td>0.0572</td>
</tr>
<tr>
<td>LKHU</td>
<td>0.0791</td>
</tr>
<tr>
<td>LR9</td>
<td>0.9801</td>
</tr>
<tr>
<td>LCH</td>
<td>0.0309</td>
</tr>
<tr>
<td>LINFL</td>
<td>0.0357</td>
</tr>
</tbody>
</table>

Source: Authors using “Eviews9”

DOI: https://doi.org/10.30564/jesr.v3i1.1066
4.5.1 Determination of Causality going from the Short-run VECM

### Table 6. Test of short-run Granger causality on the basis of the VECM (Cameroon-Congo)

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Cameroon</th>
<th>Congo</th>
<th>ECT (-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta(LPIBr)$</td>
<td>-</td>
<td>0.2665 (0.8661)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.7304 *** (3.4172)</td>
<td>-</td>
</tr>
<tr>
<td>$\Delta(LIPRI)$</td>
<td>0.0574 (1.2278)</td>
<td>-</td>
<td>-0.0665 (-0.8910)</td>
</tr>
<tr>
<td>$\Delta(LIPUB)$</td>
<td>0.4878 *** (3.1313)</td>
<td>0.1445 (0.5596)</td>
<td>0.2994 (1.3175)</td>
</tr>
<tr>
<td>Cameroon</td>
<td></td>
<td>0.7304 *** (3.4172)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.7304 *** (3.4172)</td>
<td>-</td>
</tr>
<tr>
<td>Congo</td>
<td>-</td>
<td>-</td>
<td>-0.0319 (-0.350)</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>0.1275 (0.6684)</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>0.2994 (1.3175)</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-1.1834 *** (-9.0988)</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>0.0115 (0.0665)</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-0.0556 (-0.809)</td>
</tr>
</tbody>
</table>

**Note:** *, **, *** respectively represent significance at the 10%, 5% and 1% levels and the values in brackets are the student t-statistics.

**Source:** Authors using “Eviews 9”

### Table 7. Short-run Granger causality test on the basis of the VECM (Equatorial Guinea, Gabon)

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Gabon</th>
<th>Equatorial Guinea</th>
<th>ECT (-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta(LPIBr)$</td>
<td>-0.4708 ** (-2.5250)</td>
<td>0.0095 (0.0238)</td>
<td>-1.004 *** (-5.9241)</td>
</tr>
<tr>
<td></td>
<td>-0.1933 (-1.548)</td>
<td>0.1673 (0.5927)</td>
<td>-0.2895 (-1.5968)</td>
</tr>
<tr>
<td>$\Delta(LIPUB)$</td>
<td>0.0180 (0.2209)</td>
<td>0.0931 (0.9083)</td>
<td>-0.7719 ** (-2.6989)</td>
</tr>
<tr>
<td>Equatorial Guinea</td>
<td>-0.0027 (-0.0280)</td>
<td>-0.0786 (-0.2492)</td>
<td>-0.2618* (-1.8308)</td>
</tr>
<tr>
<td></td>
<td>-0.0027 (-0.0280)</td>
<td>-0.0786 (-0.2492)</td>
<td>-0.2618* (-1.8308)</td>
</tr>
</tbody>
</table>

**Note:** *, **, *** respectively represent significance at the 10%, 5% and 1% levels and the values between brackets are the student t-statistics.

**Source:** Authors using “Eviews 9”

### Table 8. Short-run Granger causality test based on the VECM (CAR-TCHAD)

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>CAR</th>
<th>Chad</th>
<th>ECT (-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta(LPIBr)$</td>
<td>-</td>
<td>-0.6581 (-0.9010)</td>
<td>1.2589 ** (2.2804)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.2589 ** (2.2804)</td>
<td>-2.116 *** (-5.0345)</td>
</tr>
<tr>
<td>$\Delta(LIPRI)$</td>
<td>-0.0276 (-0.739)</td>
<td>-0.1321 (0.9889)</td>
<td>-0.3127 ** (-2.3779)</td>
</tr>
<tr>
<td></td>
<td>0.1213* (1.8868)</td>
<td>0.1998 (0.7848)</td>
<td>-0.2516 (-1.2523)</td>
</tr>
<tr>
<td>$\Delta(LIPUB)$</td>
<td></td>
<td>-0.1166 (-0.519)</td>
<td>0.0147 (0.2930)</td>
</tr>
<tr>
<td></td>
<td>0.2162 (1.5925)</td>
<td>-0.1021 (-0.2746)</td>
<td>-0.1303 (-0.0987)</td>
</tr>
<tr>
<td></td>
<td>0.0956 (1.4376)</td>
<td>-0.0196 (-0.270)</td>
<td>-1.262 *** (-4.7828)</td>
</tr>
</tbody>
</table>

**Note:** *, **, *** respectively represent significance at the 10%, 5% and 1% levels and the values in brackets are the student t-statistics.

**Source:** Authors using “Eviews 9”

**DOI:** https://doi.org/10.30564/jesr.v3i1.1066
4.5.2 Causality test using the long-run VECM

Table 9. Long run Granger causality test based on the VECM (Cameroon-Congo)

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Cameroon</th>
<th>Congo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LPIBr</td>
<td>LIPRI</td>
</tr>
<tr>
<td>Cameroon LPIBr</td>
<td>-</td>
<td>0.2199* (1.7899)</td>
</tr>
<tr>
<td>Congo LPIBr</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Congo LIPRI</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: *, **, *** respectively represent the significance at the 10%, 5% and 1% levels and the values in brackets are the student t-statistics.
Source: Authors using "Eviews 9"

Table 10. Long run Granger causality test based on the VECM (Equatorial Guinea-Gabon)

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Gabon</th>
<th>Equatorial Guinea</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LPIBr</td>
<td>LIPRI</td>
</tr>
<tr>
<td>Gabon LPIBr</td>
<td>-</td>
<td>-0.469** (-2.2653)</td>
</tr>
<tr>
<td>Gabon LIPUB</td>
<td>0.1988 (1.2772)</td>
<td>0.1206 (1.0486)</td>
</tr>
<tr>
<td>Equatorial Guinea LPIBr</td>
<td>-</td>
<td>-0.646*** (5.7702)</td>
</tr>
<tr>
<td>Equatorial Guinea LIPRI</td>
<td>-0.0104 (-0.0281)</td>
<td>-</td>
</tr>
<tr>
<td>Equatorial Guinea LIPUB</td>
<td>-0.0105 (-0.0281)</td>
<td>-0.3571 (-1.0416)</td>
</tr>
</tbody>
</table>

Note: *, **, *** respectively represent significance at the 10%, 5% and 1% levels and the values in brackets are the student t-statistics.
Source: Authors using "Eviews 9"

Table 11. Long run Granger causality test based on the VECM (CAR-Chad)

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>RCA</th>
<th>Chad</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LPIBr</td>
<td>LIPRI</td>
</tr>
<tr>
<td>RCA LPIBr</td>
<td>-</td>
<td>-1.102*** (-3.3379)</td>
</tr>
<tr>
<td>RCA LIPRI</td>
<td>-0.2520 (-1.298)</td>
<td>-</td>
</tr>
<tr>
<td>Chad LPIBr</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chad LIPUB</td>
<td>0.1346 (1.3048)</td>
<td>0.0022 (0.0532)</td>
</tr>
</tbody>
</table>

Note: *, **, *** respectively represent significance at the 10%, 5% and 1% levels and the values in brackets are the student t-statistics.
Source: Authors using "Eviews 9"
\( \phi_{ij} \) is, this indicates a one-way causality.

In the short run, there exists a positive, significant and bidirectional causality relationship between public investment and the growth rate of real GDP in Cameroon and the CAR. Moreover, public investment significantly stimulates private sector investment in Cameroon. However, its effect is rather negative on the activity of the Congolese private sector. The direction of causality is one-way going from private sector investment to the real rate of economic growth in Gabon and in Equatorial Guinea. However, its effect is negative and significant in Equatorial Guinea. No causality relationship is detected in Chad.

In the long run, private sector investment has a positive significant effect on the real GDP in Cameroon, Equatorial Guinea and Chad. In addition, its effect deteriorates economic activity in Congo, Gabon and the CAR. In the CAR, this result can be explained by the negative effect of public investment on private sector investment. However, we observe that in Cameroon, public investment deteriorates long-run economic growth. This result is contrary to those obtained by Chimobi (2009), Aregbeyen [5], Hjerppe and al. (2007).

4.6 PMG Estimation of the Combined Effects of Public Investment Spending and Private Sector Investment on Economic Growth

Here, we seek to simultaneously integrate government capital expenditure and private sector investments in the analysis in order to evaluate the simultaneous effects of the latter on growth. It is thus necessary to use a method which can make it possible to analyze the behavior of exogenous variables on the short run dynamics and long run equilibrium. This justifies our use of a panel ARDL model. The choice of this model rests on the fact that in addition to the critical aspects of endogeneity and heterogeneity which enables us to address, it uses the conditions of orthogonality which enable us to address the problems of autocorrelation and makes the estimates more efficient in the presence of heteroscedasticity. The choice between the Pool Mean Group and the Mean Group estimation results is done using the Hausman test.

The Hausman test tests the null hypothesis of absence of systematic differences between the coefficients in the long run from one country to another. This hypothesis is accepted at the threshold of 5%, if the p-value of the test is higher than 0.05. We find in line, table 6 that this is the case (p-value = 0.738). Thus, the PMG estimate produces better results relative to the MG. The results obtained from the approach by the PMG are presented in table 12 below.

Table12. PMG estimates of the joint effects of public investment spending and private sector investment on growth

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Coefficients</th>
<th>Dependent variable ( \Delta ) LPB</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta LIPRI )</td>
<td>2.8887 **</td>
<td>(-1.98)</td>
</tr>
<tr>
<td>( \Delta LIPUB )</td>
<td>-3.4100 **</td>
<td>(-2.21)</td>
</tr>
<tr>
<td>( \Delta LINFL )</td>
<td>2.7658</td>
<td>(0.88)</td>
</tr>
<tr>
<td>( \Delta LTCH )</td>
<td>7.5267</td>
<td>(0.69)</td>
</tr>
<tr>
<td>( \Delta LIDE )</td>
<td>-0.6887</td>
<td>(-1.48)</td>
</tr>
<tr>
<td>( \Delta LOUV )</td>
<td>2.1024</td>
<td>(0.45)</td>
</tr>
<tr>
<td>( \Delta LKHU )</td>
<td>-4.3971</td>
<td>(-1.35)</td>
</tr>
<tr>
<td>( \Delta LRFI )</td>
<td>-1.1664</td>
<td>(-0.28)</td>
</tr>
<tr>
<td>( \Delta Constant )</td>
<td>-3.0529 ***</td>
<td>(-2.77)</td>
</tr>
<tr>
<td>( ECT )</td>
<td>-0.7567</td>
<td>(-7.94)</td>
</tr>
<tr>
<td>( \text{Hausman Test} )</td>
<td>4.35</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** ***, **, * indicate significance at 1%, 5%, and 10% respectively; the values in brackets are the z-statistics or the normal distribution.

**Source:** Authors, using “Eviews 9”

Table 12 above shows that in the short run public capital expenditure has a negative effect on the rate of real economic growth which significant at the 5% level. Also, private sector investments have a positive significant effect at the same level in the short run.

In fact, this result that seems paradoxical to theory is explained by an unstable social and macroeconomic environment represented by a negative coefficient of the variable political risk. This leads to a reallocation of public expenditure to support war efforts. It is thus understandable that public investments are clearly reduced and
this leads to a fall in economic growth. Moreover, faced with the risks of over-indebtedness and a deterioration of budgetary viability, many countries of the CEMAC zone have engaged in a policy of budgetary cleansing through a gradual limitation of the volume of expenditure and an increase in public revenue. But, given the need for investments in infrastructures and other pro-poor expenditures and the fall in income from the raw materials, budgetary cleansing appears difficult for certain countries. This is particularly the case of Cameroon and Congo that saw their position being degraded because of an expansionist budgetary orientation.

These results are in line with those of Kahn and Kumar (1997) who show that the effects of private sector investment and public investment on growth are significantly different in periods of instability since private sector investment is in a consistent manner more productive than public investment. Good economic institutions thus remain one of the most convincing means likely to stimulate public investment. Good economic institutions thus remain one of the most convincing means likely to stimulate investment by improving returns thanks to the reduction of transaction costs. These results are in line with those of Avom and Song, Baye, obad and Jamal who, besides rekindling the debate on the appropriateness of government expenditure recognize the positive and essential role of public investment expenditure on the GDP.

Contrary to the economic theory which supports the long run complementarity between public and private investments, we obtain an eviction of private sector investments by long run public investments. Public investments positively and significantly affect growth at the 1% level. However, private sector investments have an opposite effect. This finding is justified by an increase in budget deficits which undermine the economies of the sub-region and pushes the State to resort to banks in order to continue to finance public investments. This is likely to discourage the private sector. Also, the launching of structuring projects by various States reveals the need for tax adjustments and discourages entrepreneurial initiative. These results are in line with those of Ramirez and Aschauer.

On a purely illustrative basis, we can talk of the implementation of structuring projects in Cameroon and Gabon and of a national plan of economic and social development (PNDES) aimed at making of Equatorial Guinea an emerging economy by 2020. Knight, Loayza and Villanueva, and Nelson and Singh highlight that the level of public investment in infrastructures has a significant long run effect on growth.

A cross-sectional study on a sample of 119 countries carried out by Easterly and Rebelo shows that public investment in transport and communications is positively related to long run economic growth.

Still in long run, the exchange rate positively and significantly affects growth at the 5% level. The elasticity of the exchange rate is higher than one. Thus, a unit point increase in the foreign exchange rate leads to an increase in the growth rate of 1,46 units. The countries of the CEMAC zone after a mitigated success in programs of economic revival undertaken after the devaluation of 1994, attempted to diversify their economies in view of stimulating exports at the detriment of imports. The majority of them are dependent on incomes from oil and suffer from exogenous shocks that affect this sector. In the debate on the orientation and growth in foreign trade, several researchers try to determine if the misalignment of the real exchange rate exerts a shock on private sector investment and thus, economic growth. Various cross-sectional studies that use different exchange rate and distribution models find a negative impact of the distortion of the foreign exchange rate on economic growth.

Moreover, the instability of the euro area exerts a double effect on the economies of the countries of the zone. On the one hand, the crisis of the euro area leads to a reduction in the exports of CEMAC countries towards Europe; and on the other, a decline in the value of the Euro promotes the exports of CEMAC countries towards other markets. Beyond these possibilities, the question of the monetary sovereignty of the CEMAC countries remains a major stake given the important implications for the diversification of exports and the development of companies. In the event of an intensification of the global crisis, there exists a risk related to confidence in the system of external payments. This risk is partially reduced by the guarantee of convertibility given by France to the CFA Franc. In the event of a sudden loss of confidence towards the CFA franc or its banking system, a strong reaction of the BEAC with emergency measures will be necessary to avoid bank runs.

The elasticity of the coefficient of foreign direct investments (IDE) is negative in the short and long run. Specifically, the greater the volume of inflow of the foreign assets, the more growth evolves in an opposite direction due to the repatriation of the income from these investments. Thus, a unit increase in IDE leads to a fall of 0,68 units and 0,12 units in economic growth in the short and long run respectively, although these results are not significant. These findings are contrary to those obtained by Acemoglu and Zilibotti. Other authors rather find a close relationship between the uncertainty of credit and the negative reaction of foreign direct investment on economic growth in developing countries.

The rate of inflation is positively related to the growth
rate but this relationship is not significant \(^1\) in the short and long run. Thus, price stability is not favourable to the development of economic activity but it simply enables the economy to survive.

Following this reasoning, Bikai and Kamga \(^{[16]}\) study the “effects of thresholds of inflation on economic activity in the CEMAC zone: an analysis using a panel data model with non-dynamic thresholds”, and using the iterative procedure of determination of endogenous thresholds developed by Hansen \(^{[42]}\) identify an optimal threshold of inflation of 6% in the CEMAC zone, thus revealing a non-linear relationship between inflation and growth. In other words, below this threshold, inflation has a positive impact on the economic activity and any monetary policy that increases inflation is likely to improve economic activity. Beyond this threshold, it is the reverse that occurs.

Moreover, in the long run, the positive coefficient which is statistically significant at the 1% level of human capital shows that a unit increase in gross secondary school enrolment leads to a 1,71 units increase in the growth rate. This result is similar to those of Barro and Sala-i-Martin \(^{[11]}\), Romer \(^{[69]}\), and Barro \(^{[10]}\).

5. Conclusion and Recommendations

This study seeks to examine the simultaneous effects of public capital expenditure and private sector investment on economic growth. Using a panel covering the 1982-2017 period, we apply the Pédroni \(^{[64]}\) and Kao \(^{[48]}\) cointegration test which enables us to confirm the existence of a long run relationship between the variables. From our Pool Mean Group estimates, we find that the taking into account of the variable political risk in the estimation reveals us the real effects of public and private investments on economic growth in the CEMAC region. We find that public investment has a negative and significant impact on growth while private sector investment improves the real output in the short run. In long-run however, the effects are reversed: the contribution of public investment is positive and significant and that of the private sector investment is negative and significant. It is thus urgent for the countries of the CEMAC zone to reinforce the management systems of public investment in view of lifting the obstacles to the development of the private sector and ensure a sustainable economic growth. Governments can therefore call upon the private sector for the supply of necessary goods and services, for example, the construction of schools or hospitals, dams, and the extension of the highway network \(^{[27]}\). We however agree that when they are weak, political institutions are likely to damage the efficiency of public investments, thus blocking its effects on growth \(^{[29]}\).

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REVIEW

Digital Economy: A Vision From The Future

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A single criterion of efficiency
Forecasting the future from the future.

ABSTRACT

The article shows that the foundation of the digital economy can be a new paradigm for predicting the future from the future, i.e. from the future in which the development goal has already been achieved. This allows to minimize all costs and completely avoid incorrect system solutions of the existing trial-and-error approach. Using the achievements of the technological revolution of Industry 4.0, an effective digital economy can be formed only when it is seen as an economy of coordinated interests between the state, business, society and the interests of each individual in real time at every local level. This will make it possible to solve the problem of ensuring the high quality of life not of citizens in general, but of each individual.

1. Introduction

The article was written on the basis of research conducted by the author from the period when in the country, under the leadership of academician V.M. Glushkov, there was an attempt to practically implement the idea of the OGAS, as well as of research ongoing to this day. All these works reveal the reasons why the introduction of the achievements of scientific and technological progress for a long time only intensifies the crisis in the socio-economic development of Russia and its lag behind the advanced countries of the global world is growing. As the President of Russia said on December 8, 2018, the danger of this phenomenon is that “The world as a whole is in a state of transformation: a very powerful, dynamically developing transformation. If we do not ori-
tent ourselves in time, if we do not understand in time what we need to do and how - we can lag behind forever". Therefore, the main goal of the work is to draw the attention of the scientific community and decision-makers that a new methodological toolkit developed by the author can become the foundation for identifying the causes of all the problems of Russia's development and solving them. The basis of the toolkit is:

1. definition of a single goal-setting;
2. integrity, complexity, system approach and interdisciplinary in understanding and in relation to the identified objectively set goals;
3. a single indicator for comparing all processes - "time";
4. a single criterion of effectiveness for the entire system and any subsystem in any context - this is the "time between" the goal and the reality where each individual, country and the world are as a whole.

A new methodological toolkit made it possible to form a new paradigm for predicting the future from the future, that is, from that future when the goal is achieved. A vision from the future made it possible to understand:

5. patterns of development of the human community and ways to achieve the goal;
6. the nature of a systemic crisis and there are only two development paradigms, one of which is characteristic of crises, and the other can create all conditions for development without crises;
7. in the conditions of the technological revolution of Industry 4.0 and the rapid implementation of digital devices, to form a digital economy and solve all 12 national projects together and with a minimum of resources and time and achieve an objectively set goal will become possible only when a single development strategy for Russia is developed and implemented.

At the same time, the digital economy will be considered as the economy of agreed interests between the state, business, society and the interests of each individual: in real time; at each local municipal level in the regime of self-government; when implementing personalized production using digital technology at his request, without producing anything superfluous. These are the basic conditions for solving all problems and we get a forecast horizon not for 2024 or 2030, but for the whole long term until the goal is achieved. Thus, a vision from the future provides a choice of a model of the future not by trial and error, but with an understanding of the ultimate goal and in the interests of each individual living in the whole of Russia. This is the only possible condition that can motivate each individual to realize their own potential, to increase labor productivity, to ensure accelerated and sustainable development in time and space in relation to the goal while reducing consumption of all types of resources. And this ensures the quality of life not of citizens in general, but of each individual.

2. OGAS as The Beginner of Digital Economy

It seems that for the first time the idea of creating a digital economy was written back in the late 60s of the last century in the works of the Soviet scientist, developer of electronic computers in the USSR, doctor of technical sciences, professor, honored worker of science and technology of the Russian Federation, academician of the Russian Academy of Natural Sciences Anatoly Ivanovich Kitov. Then he posed a question to the top leadership of the USSR and the scientific community about the need to manage the economy throughout the country based on the widespread use of electronic computers. Speaking about the possibilities of such management, A. A. Kitov wrote: “In industry, using digital machines, automatic control of individual units, machines, and production lines and even entire automated plants is carried out. The use of electronic digital machines reduces the number of staff, saves materials and energy, increases production speeds (increases the pace of work), improves product quality and reliable control over the production process ... and digital machines can be used for semi-automatic control and control of complex production, energy or combat systems". At the same time, Kitov convinced the country's leadership that the implementation of his project would allow the USSR to overtake the United States in the development and use of computer technology without overtaking them (as he said, "Overtake without overtaking").

Since 1962, this idea was developed by the director of the Institute of Cybernetics of the Academy of Sciences of the Ukrainian SSR, Academician Viktor Mikhailovich Glushkov. He rethought the project of A. I. Kitov and intensified work on the creation of automated control systems (ACS). Since then, the introduction of computers in the national economic complex of the USSR began. There was a project for the creation of various types of ACS (automated control systems) and based on them to create a nationwide automated system for recording and processing information. The so-called OGAS system. It was intended for the automated management of the entire economy as a whole. Academician Viktor Glushkov was a pioneer of this development.

From various sources, one can trace several versions of Glushkov’s proposals for the creation of an OGAS. In 1962, he proposed the OGAS project as a three-level network with a computer center in Moscow, up to 200 mid-level centers in other large cities and up to 20,000
local terminals in economically important places that exchange information in real time using the existing telephone network. Then Glushkov proposed using the system to transfer the Soviet Union into a new type of economy using an electronic payment system. This project has been rejected.

Since 1965 methodologically, the creation of the OGAS began to be designed taking into account the industry and territorial principles of economic management used in the USSR. It was assumed that the system will be based on industry-specific automated control systems (ISACS) to provide automated computerized economic management within each separate branch of the USSR on the one hand, and territorial automated control systems belonging to the USSR State Gosnab, the Central Statistical Bureau of the USSR, and the State Planning Commission of the Union republics on the other. This should have allowed the formation of the optimal structure of the macro-technological production process throughout the USSR and, as the OGAS developers considered, to be able to carry out operational control over the implementation of this project.

By 1980, the “Technical design of the OGAS system” was developed. But it was not approved. And after the death of Viktor Mikhailovich Glushkov on January 30, 1982, the project was stopped.

As you can see, OGAS as an idea has not been implemented. The author of this idea himself said, roughly, the following: the economic system that has developed in the USSR is so clumsy and immune to the achievements of scientific and technological progress that it is comparable to using an electronic computer (PC) to control cart.

At about the same time, carried away by the ideas of the OGAS, the author of this article investigated the problems of introducing the achievements of scientific and technical progress and automated control systems in trade. And also got a negative result.

What was it like? Studies have shown that the more achievements of scientific and technological progress and ACS will be implemented in the national economic complex, the more and more imbalances in the economy will be. That is, the acceleration of technological processes in production, in wholesale trade and at the same time maintaining the orientation of the production of consumer goods towards an abstract consumer slowed down all processes in retail. And this is how, the author wrote, it will lead to a crisis in the economy in that rigidly centralized model of the state system of management and planning that prevailed in the USSR. The worse it will be for a particular person. That is, the system was non-cybernetic, without feedback in understanding the negative results.

Having received such a result, and driven by the desire to do at least something to save the idea of the OGAS, but in a new reading, the author took part in the All-Union Conference on the problems of the OGAS, RASU and ACS. The conference was dedicated to the 60th anniversary of Academician V. M. Glushkov and was held in Kanev on September 20-23, 1983. Given the brief abstracts published in the collection of that conference, I quote them verbatim.[6]

3. OGAS in the System of the Economic Mechanism of the Relationship between Production and Consumption

At the stage of developed socialism, production relations are still commodity, and the satisfaction of personal material needs is more than 90% inherent in the commodity-money form, and therefore the economic mechanism of the relationship of production and consumption can be viewed through the mechanism of the relationship of production and trade.

It has been established that the circulation time of consumer goods is more than double the time of their production (in general for all goods, for individual groups of goods this time difference is even greater). The imbalances in the time of production of goods and their circulation mean that funds spent on the production of goods are returned to the state budget with a great delay.

Violation of the regularity and proportionality of accelerating all processes in social production and lengthening the time of circulation of goods in comparison with the time of their production are the cause of the emergence and intensification of other imbalances and negative phenomena.

Entering into the system of relations of a specific person with all his material and spiritual needs, state of health, desire to work according to his ability, etc., establishing optimal relationships between social production and this person will give the sum of optimal relationships at the level of the labor collective, region, republic, and the entire national economy. Only with such organizational and economic forms OGAS can become a reality, just as these new relations without OGAS cannot exist. Thus, the new economic mechanism of the relationship between production and consumption will make it possible to organically combine the achieved level of development of productive forces with the advantage of the socialist economic system, establish accounting and control over the measure of labor and the measure of consumption in the interests of each individual, collective and the whole society. Only these measures can give great scope to the action of the enormous creative forces inherent in our
economy.

These are the results that are presented in my theses, and over time, re-reading the OGAS draft design of 1980, the desire to convey the conclusions of my research to the intended followers of V.M. Glushkov becomes clear. Indeed, in various chapters of the draft design it was directly stated that:

1. For OGAS, the sectoral and territorial principles of construction were laid. The economic system of the USSR was considered as a socialist form of ownership of the means of production, combined the natural and price aspects of functioning and development [7];

2. OGAS was considered as the data-processing base of the system of planned management of the national economy. Its functioning should have been carried out on the basis of socialist control and management methods [7, p. 47].

3. The functions of the OGAS should cover not only the economy, but also all spheres of public life. For example, it was planned to informatize medical records of the population, utility bills, labor relations, and even a complete transition to a non-cash form of payment by citizens for the purchase of goods and services [7, p. 84].

4. It was declared that program-targeted planning is the basis of the OGAS. And on this basis it was supposed to achieve full satisfaction of the material and cultural needs of citizens through the introduction of such a management system.

These provisions of the OGAS and their implementation have been questioned in my empirical studies. And the most important thing: for the first time, sorting through various options for improving the relationship between production, wholesale and retail trade, and improving trade itself in order to reduce the circulation time of goods, it was concluded: the growing imbalance could be eliminated only if economic, technological, technical and organizational conditions for the integration of production were created and trade within the region, territory, district. And all this could be successfully solved using an intersectoral automated control system (since automated control systems were then widely used) by the production and sale of consumer goods on a computer basis. This would allow, as I argued, to move in the future from studying the demand of the population of a particular region and drawing up applications and orders for the production of goods for an unknown consumer to studying and identifying needs and drawing up orders for the production of specific goods for specific customers. Then the time spent by the goods in the sphere of circulation would be reduced to a reasonable minimum. The imbalance in the time of production and the time of circulation of goods and money would be eliminated. Consequently, the very root cause of the crisis would have been eliminated. However, the interests of various departments and various scientists were stronger than the interests of the end-user. The question arose: how to coordinate the whole diversity of interests? The system was becoming more and more inefficient. The ideas of perestroika and economic reforms have already loomed ahead. The collapse of the USSR was predetermined, because for this, economic prerequisites have ripened. In the future, all this was confirmed. The result is known. State power did not overcome the crisis, and the USSR ceased to exist.

Nevertheless, the result of the empirical stage of research was as follows: in order to eliminate the imbalance that has arisen, production should be carried out by order of a specific person, bypassing the production of anything superfluous. All the components for the transition to such a new model of future life management were then already available, however, in its infancy. But there were still no answers to many questions. For example, what methodological toolkit should be used or a new one should be developed in order to confirm or refute the results of empirical studies. The political and economic search for answers to this question has begun.

The political and economic stage of research has led to the understanding that time should be taken as a general indicator that characterizes a positive or negative movement relative to a goal. But for this it was necessary to determine the purpose of the development of society.

In the draft design of the OGAS a clear unequivocal understanding of the goal was not formulated. When reading a project, you can find a variety of goals systematically not united by one goal. It says that the OGAS is created with the aim of collecting and processing information for accounting, planning and managing the national economy on the basis of the State Network of Computing Centers (GSVC) and the State Data Transfer System (OGSPD). And if it was a question of OGAS subsystems, for example, a forecasting subsystem, then there were already other goals. For example, the main objectives of the forecasting subsystem were determined by compiling options for long-term forecasts of interrelated indicators of national economic development and making forecasts for some of the most important national economic problems [7, p. 97].

Another subsystem of the OGAS - the automated system of planned calculations (ASPC) had a different purpose. It was created to develop promising, long-term, medium-term (five-year) and current (annual) plans. ASPC was to provide:

1. determination of a system of indicators for long-term, medium-term and current national economic plans
that meet the requirements for the state planning and management system in terms of receipt and quality of information;

(2) finding the most effective options for the planned development of the national economy, optimization of planned designs;

(3) monitoring the implementation of planned targets, making adjustments aimed at eliminating the emerging imbalances in the national economy, implementing the functions of planned regulation in accordance with the emerging internal and external conditions;

(4) analysis of economic and social problems of the growth of social production [7, p.141-142].

All the provisions that reveal the content of this goal indicate that the USSR, even when implementing the OGAS, was not immune from imbalances and problems in the social and economic growth of social production. And this, despite the fact that the important point in fulfilling the functions of the OGAS was the determination that the system of economic-mathematical models was the theoretical basis of the functional structure of the OGAS. Such basic modeling methods were adopted as “brainstorming”, extrapolation method, options for multivariate regression and correlation models and others. All these methods, in the absence of an unambiguously accepted goal, contributed to the fact that the development of the USSR was planned to be carried out and was carried out by the “trial and error” method.

In the political and economic literature of that time, the goal is formulated by the basic economic law - the law of satisfying ever-increasing human needs, or the law of goal-setting. With such a goal, the governing political and economic law of exaltation of needs indicates that mankind creates a consumer society, since one satisfied need gives birth to a new one and so on endlessly until all resources are exhausted, but the goal is not achieved [9]. But, if we take a specific person as the primary unit of society in all the diversity of his needs, then the goal will be achieved only in that form of production relations in which a direct relationship between production and a specific person is established. The production of goods is carried out at the request (order) of a specific individual subject to equal and free access to spiritual and material goods and their maximum diversity. This excludes the possibility of producing excess goods, in which case the resources are used efficiently, and the released time and resources can go to human development. And already on this fundamental basis it is possible to fully form an objective understanding of that model of human relations that does not conflict with the achievements of scientific and technological progress and can ensure development without crises on the way to achieving the identified goal.

4. Vision of The Future from The Future

Since 2000, the era of building the information society begins. And now - building a digital economy. And they are considered mainly as a technical and technological problem for processing at an incredible speed increasing data arrays (BIG DATA) and within the same paradigm of the development of the human community with all the negative consequences that are described above. [9,10]. In a comprehensive, holistic, systemic and multidisciplinary understanding and taking into account the finding of a common development goal, no one is considering this problem. There are many goals and they are very different.

It is right to recall here that back in the late 60s of the 20th century, International Non-Governmental Organization the Club of Rome, which arose on the initiative of the Italian economist Aurelio Peccei, put forward a program to study global problems and set a goal: to give society a method by which one could reliably analyze all the “difficulties of mankind”. In total, more than forty reports have been issued on behalf of the Club of Rome since 1968 - almost all of them are positioned as works addressed to the Club and supported by it.

A new report by the Club of Rome “Come on!” was released at the end of 2017. The concepts expressed by E. Weizsacker and A. Wijkman on 220 pages of the book text are anti-globalist in nature and de facto require a change in the entire mode of production and consumption of modern humanity, but do not answer the question of how to do this. [11]

Currently, the World Economic Forum in Davos is considered, along with the Club of Rome, the most advanced “factory of thought”. In January 2018, a report was announced at this forum in which the most likely risks for the global economy were identified. These included: (1) extreme weather phenomena; (2) natural disasters; (3) cyber-attacks; (4) data fraud or theft; (5) inability to cope with the adverse effects of climate change; (6) large-scale forced migration; (7) man-made natural disasters; (8) terrorist attacks; (9) illegal trade; (10) bubbles in the asset markets of key economies [12]. Last January the International Economic Forum presented a new report on global risks of 2019. The general thing in these reports is that they analyze statistical and empirical information of the past with the help of various mathematical models, ascertain the fact of increasing risks and, using surveys, try to understand what to do in the future. So, the report presents the results of the latest Global Risk Perception Survey, in which nearly 1,000 decision makers from the public sec-
tor, private sector, academia and civil society assess the risks that the world faces. Nine out of 10 respondents expect aggravation of economic and political confrontations between the major powers this year. [13]. But despite such a detailed analysis, from their point of view, the global society of people still seems to be a probabilistic society, not strictly predicted and controlled, and is characterized by a high level of uncertainty in the future with the rapidly growing other risks.

At one time, Academician N.N. Moiseev wrote that "at a certain stage in the development of civilization, humanity will have to take responsibility for its further evolution." But in his book "To be, or not to be - humanity's dilemma?" there are two mutually exclusive phrases. The first - "If a person does not find the right key to his relationship with nature, then he is doomed to death" and the second phrase - "I want to warn the readers of this book in advance that they will not find specific recipes in it to save humanity. Yes, such recipes cannot exist, for the future is unpredictable." [14].

But if we look at this problem with the help of a new methodological toolkit and with the understanding on its basis of a vision of the future from the future, and not from the past and the present, as is customary in traditional scientific knowledge, it turns out that a person can, having understood the laws of his development, understand his future. And on this basis, society can choose only that development model that allows accelerating evolutionary (without returns, and therefore without crises) to bring this future closer.

In the context of the technological revolution of Industry 4.0 and the rapid implementation of various digital devices, artificial intelligence, the Internet of things, bio-, neuro- and other technologies of 21st century generated by it, different countries can have different relations between the state (government), society, business and a specific person, depending on the choice of development goal [15-17]. Studies through the prism of new methodological toolkit have shown that three models of the development of the human system are possible. Only one of them suggests that development will not proceed by trial and error, but consciously, with an understanding of the future from the future and its ultimate goal. [18] Orientation to the interests of a particular person through the implementation of digital technology at his request will allow not to produce anything superfluous. It will also help to keep resources in pristine condition and find free time for human development. All this will be the only possible condition that can motivate each individual, especially a young one, to ensure accelerated and sustainable development in relation to the goal. As a result, in this model, the technological (digital) singularity is synchronized with the singularity of the formation of new relationships between people and their awareness of the need for evolutionary, without returns, to bring closer the moment of achieving the goal of global development in a conscious and understandable future.

Now the world is between the first and second model. But the rapid implementation of various technologies, digital devices, artificial intelligence, bio-, neuro- and other technologies of the 21st century with the aggravation of international relations, migration processes, sanctions, trade, diplomatic wars and other negative phenomena around Russia, between the United States and China, USA and Europe, etc. accelerate bringing the world closer to the second development model. The ultimate goal is control over the whole world and every person. The consequences have already been written above. Risks will increase, and the states themselves may disappear.

Consequently, it becomes critically important that states and their leaders, for their own preservation and preservation of their peoples, for ensuring universal security and transition to sustainable development, take care, first of all, of solving the problem of forming a third development model and strategy for achieving it in a future that is understood and accepted by all.

To make this transition to the third development model becomes possible only with the help of digital and other high technologies of the 21st century. The adequacy of the new form of production relations and new productive forces ensures the achievement of the global goal with minimal resources, ever-decreasing expenses of working time and increasing expenses of free time for one's own excellence in the physical, intellectual, spiritual plan.

5. Conclusion

Thus, a vision of the future from the future gives us the understanding that new productive forces, such as digital and other high technologies of the 21st century, must correspond to completely new production relations between people that are not in conflict with them. This feature was noted in a speech by President of Russia V.V. Putin at the meeting of the Council for Strategic Development and Priority Projects in July 2017: "the digital economy is not a separate industry, in fact it is a way of life, a new basis for the development of public administration, the economy, business, the social sphere and the whole society" [19]. Only such relations become the basis for the formation of institutional, financial mechanisms and infrastructure projects for the development of the digital economy, and not vice versa. A prerequisite is the transition at the local level to a new model of life management with the simultaneous...
development of a mechanism for its implementation. Such a mechanism, as described above, is a mechanism for reconciling interests between the state, society, business with the interests of each individual in real time and the entire digital communication infrastructure between them. And this mechanism is the mechanism of becoming a digital economy safe for humans.

It seems that a tool that can fully realize the mechanism of coordination of interests is blockchain technology. The platforms for conducting an operation between equal partners acting without intermediaries are based on this technology, and in which decentralized storage of information is used to display all data on operations to coordinate interests separately at each local level. After all, technologically, blockchain systems do not need either intermediaries or centralized management. Contradictions are resolved on the basis of the “bee swarm” principle, that is, based on the collective opinion of all parties involved, they are governed by their own laws and operate almost autonomously.

Now the digital economy can really be seen as an economy of coordinated interests between the state, society, business and the interests of a particular person in real time at each local level, in which everything is aimed at achieving a given goal. And that means it is aimed at approaching the future. The main role of states will be the government realizes the need to redistribute its functions and budgets from the upper, sometimes rigidly centralized level, to the local level.

Such a management model is extremely flexible, because it does not adapt to what is happening today in a rapidly developing and changing world, but is based on a unique understanding (vision) of the future from the future and the mechanism for its achievement.

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ABSTRACT

This report presents an analytical framework for exploring the implications of Fintech innovations for incumbent banks and for provision of the financial safety net. The focus is on “digital banking initiatives”, that is, on Fintech initiatives that provide retail financial services akin to those traditionally provided by banks. Banks perform a wide range of functions for individual and institutional customers that help facilitate large-scale economic activity. In fact, in most economies the system of financial intermediation centres on banks and relies on their core products and services for financing of the economy and the maintenance of liquidity. On account of the central role banks play in the financial system, along with concerns about potential systemic instability linked to the riskiness of their activities, these institutions have long been regarded as “special”, as reflected in their prudential regulation and coverage under the various provisions of the financial safety net. Recent developments raise questions about the special status of banks. Two sets of questions are addressed herein: To what extent do new digital banking initiatives change the role that incumbent banks play in the financial system and the way that they perform their functions? To what extent are some of the new digital banking initiatives securing the benefits of the financial safety net without paying the commensurate price? To help address these questions the report first revisits the literature on core functions of the financial system to provide a framework for analysing recent developments. Particular attention is paid in this context to banks and their products and services. The “special” role of banks is discussed, which links to the provisions of the traditional safety net. These overview sections are followed by evidence on Fintech innovations that overlap the core banking products. Based on an examination of the characteristics of these new initiatives, the study then touches on the issue of whether banks are still special and whether some of these initiatives are or should be covered by financial safety net provisions.

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1. Executive Summary

This report presents an analytical framework for exploring the implications of Fintech innovations for incumbent banks and for provision of the financial safety net (FSN). History shows that the FSN is not a rigid construct. Its contours and provisions have been altered over time as events have required. Recent Fintech developments in the banking sector are again raising questions as to the optimal scope of the FSN. The focus in this context is on “digital banking initiatives”, that is, Fintech initiatives that provide retail financial services akin to those traditionally provided by banks.

Banks provide a bundle of products and services that are central to financing of the economy and the maintenance of liquidity. Digital banking initiatives overlap many of the activities and functions that banks provide in the retail market segment, including some of the functions typically deemed to make banks “special” under the provisions of the financial safety net. They are effectively unbundling and re-bundling retail banking services and products, which they provide (1) separately in some cases, (2) in re-bundled form together with other services, or (3) together with new services or at least in a manner that is more convenient for customers.

While increased competition among suppliers of products and services in the financial system is generally thought to be “good” because it reduces frictions and lowers costs for end-users, opinions are more divided when it comes to banks. This reflects in part the central role banks play in the financial system and the importance of their core activities and functions to financing of the economy but also concerns about the potential systemic implications of major banking sector instability. In fact, the desire to minimize systemic risk and preserve stability of the financial system are the principal motivations for bank regulation and safety net arrangements consisting of deposit insurance and the services of a lender of last resort, with the former representing the de facto price paid for the protections under the FSN\(^1\). Factors that make banks special in this context include the following three financial functions:

1. Taking deposits that are withdrawable on demand at par;
2. Providing liquidity to other entities, and thus, given the first function, engaging in maturity transformation;
3. Acting as conduits for the payment system and for monetary policy transmission.

“Specialness” owes in part to the fact that some activities, namely deposit taking\(^2\) and maturity transformation, require the backing of the FSN to the extent they are intended to be performed by private intermediaries. Maturity transformation is necessary to ensure that the system has an adequate supply of liquid funds, and the current system of fractional reserve banking fundamentally relies on banks producing adequate supplies of money. In fact, a crucial characteristic of the current system entails banks taking demandable deposits and engaging in maturity transformation by on lending them at longer maturities.

These are the two types of activities of banks that are linked to most of their own and the financial system’s core functions. The fact that banks have historically been the only institutions engaged in the joint conduct of these activities explains why banks as institutions have uniquely been at the core of the financial safety net—beneficiaries of its protections but also subject to its costs.

On this point, the report concludes that banks remain unique in providing the specific combination of three core financial functions listed above. To the extent this bundle remains the sole criterion for access to all safety net requirements, then banks will be the only institutions at the core of the FSN. However, it is important to note that the FSN is not a rigid construct. Rather, its scope has been altered over time as events have required. Recent developments are again raising questions as to the optimal scope of the financial safety net.

For example, digital banking initiatives provide transaction accounts, and in many cases, the balances are covered by deposit insurance. In fact, the report notes that a growing number of digital banking initiatives that were established independently from incumbent banks have applied for and in many cases obtained deposit insurance coverage. Banks pay deposit insurance premiums but are also regulated to limit the moral hazard of excessive risk taking on the financial safety net. Shouldn’t digital banking initiatives pay a commensurate price?

Digital banking initiatives serve as a reminder of the limitations of an entity-based approach to regulation. While the need for regulatory and supervisory approaches to Fintech to be in principle more activities-based rather than entity-based has been acknowledged for some time, in practice, the entry point for regulators and supervisors remains an entity, and new entities are not automatically included within the perimeter of the FSN. Consequently, the unbundling and re-bundling of financial services by digital banking initiatives implies that financial services

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\(^1\) The literature on deposit insurance notes that while deposit insurance can eliminate the incentive for depositors to run and thereby constrain risk taking on the part of bank managers, it also gives rise to moral hazard, which requires someone else to monitor and discipline banks.

\(^2\) Bank customers in a fractional reserve banking system know their deposits are not backed by enough liquid assets. Thus, the only certain way to retrieve all their funds in times of uncertainty is to be among the first to withdraw funds. Even otherwise solvent banks can fail if a large enough fraction of its depositors or creditors behave this way.

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that are similar, if not functionally the same, are partly provided by regulated incumbent banks and partly by new and more lightly (or un-) regulated digital initiatives. Where new and lightly regulated digital initiatives are providing services that are also part of the bundle of services provided by banks (and are part of the services that make banks special and justify their position at the core of the FSN), raises questions about the special status of banks. The report argues that banks remain special, not least because the consensus view among policy makers and central bank officials continues to be that the prevailing system of intermediation centred on banks has functioned adequately and needs no fundamental change.

As for the competitive challenge digital banking initiatives pose to incumbent banks, it is important to note that banks and Fintech initiatives are not always direct competitors. Rather, there are various forms of collaborations between incumbent banks and new Fintech initiatives. They include contractual relationships, partnerships, and acquisitions. These collaborations make it difficult to assess the degree to which digital banking initiatives pose a serious competitive threat. The report pays particular attention to one form of collaboration—the use of application programming interfaces (APIs). The use of APIs has been encouraged by regulatory initiatives such as the second European Payments Services Directive (PSD2) and by “open banking” initiatives introduced or under consideration in various jurisdictions, such as the United Kingdom and Australia. APIs are becoming the primary mechanism by which banks enable third parties to develop applications that run on top of their infrastructure to link to the banks’ client bases. The nature of the access granted, how access is priced, and the function of the API in the structure are keys to understanding what role if any the banking licence plays in the relationship. APIs represent a connection between new digital banking initiatives, which might or might not be covered by prudential regulation, with other provisions of the FSN, such as deposit insurance. If so, the question of whether an adequate price is paid for FSN access needs to be carefully assessed to protect the safety net from any potential undue risks.

2. Introduction

The financial services sector has experienced marked structural changes over periods of time. The pace of change tends to ebb and flow in response to shifts in competition and innovation, in deregulation versus re-regulation, and rising protectionist moves versus initiatives to open the marketplace to outside competitors. These factors explain the pattern in recent years, with rapid and significant improvements in information technology playing a central role. Developments have also been supported by an easing or removal of regulatory and other barriers to entry in some market segments and aided by changes in customer needs and risk preferences.

The effects of these changes can be seen across the full spectrum of financial system value chains, ranging from the types of service providers, the range of products and services offered, and the distribution channels used to deliver them to different types of customers. The process of digitalisation has been underway for a few decades, although the pace of change has quickened more recently, especially as digital infrastructure has been further deployed and as devices like smart phones, which are many times faster and more powerful than computers of old, provide ubiquitous computing and access.

The digital transformation is having pronounced effects across the economy and finance is no exception. Whether we are somehow at the cusp of a paradigm shift remains to be seen but putting aside the hype that can arise during periods of sustained innovation, the potential for further marked structural change is quite high. The technological shift to digital forms of interaction has already begun to alter the nature of assets that generate value, how ownership is imparted and where value is being generated. In turn, these shifts change the structure and operation of markets, enable the formation of mini-economies or eco-systems and ultimately influence how relationships – both economic and social – are developed, maintained and located.\[22]\n
This report looks at the implications of digital innovations for certain core functions of the financial system. Its focus is on the functions typically associated with depository institutions (i.e. banks) and the provision of the financial safety net (FSN). Questions that arise in this context include whether banks remain “special” and thus warrant the protections afforded by the FSN or, rather, as Bill Gates once quipped ‘banking is necessary, banks are not’. The types of commercial-loan and deposit-like substitutes that have emerged in the financial marketplace move this question from the hypothetical realm to the board room, pushing banks to become more data-driven and innovative.

The report proceeds as follows: the next section revisits the literature on core functions of the financial system to provide a framework for analysing recent developments. This review leads to consideration of the ways in which the functions are achieved, with attention focused on retail banking institutions and products. The analysis of institutions and products is followed by a discussion of the special role of banks, which links to the provisions of the traditional safety net. These overview sections are followed by evidence on related Fintech innovations in areas...
overlapping the core banking products. We label these innovations “digital banking initiatives” to focus on entities or arrangements that are directed at subsets of retail banking. The final section offers preliminary conclusions regarding the questions whether banks are still special and whether new digital banking initiatives are and should be given access to the FSN.

3. Core functions of the financial system

3.1 The Financial Intermediation Process

To examine the implications of digital banking initiatives for incumbent banks and the FSN we look first at the economic functions that are being performed and at the underlying products and services that are used. The financial services business entails a wide range of products and activities. Our focus is on the small subset of products and activities that relate to the core functions of the financial system. According to Merton (2013), “The core function of the financial system is to facilitate the allocation and deployment of economic resources, both spatially and across time, in an uncertain environment”. It is a means to an end, namely helping the economy to fully exploit its growth potential by ensuring that viable investment opportunities receive necessary funding at appropriate costs.

There is both an allocative efficiency effect and a scale effect at work here, but it is not completely clear which dominates; that is, whether a well-functioning financial system improves economic growth primarily through higher levels of investment or by targeting investments to more productive uses. There is less ambiguity as to what happens when the financial system malfunctions.

The financial crisis of the late 1990s is another in a long list of examples. It was the result of misallocation on a grand scale and the economic and social costs that resulted from it illustrate why so much attention is devoted to efforts to avoid crisis outcomes. In fact, what differentiated successful economies from others is the ability to reduce the risk and frequency of financial crises and, thereby, the costs of shocks. The FSN is one component of these policies. Ensuring the financial system functions properly is another.

In general, good financial systems depend on good “institutions”, which include not only financial intermediaries and markets but also properly functioning informational, regulatory, legal, and judicial frameworks. This foundation enables the financial system to perform its functions. The process seems simple: all it takes is a source of excess funds and a roughly offsetting source of demand. The key is the intermediation process that brings the two together. The challenge is that the needs and preferences of those looking to finance projects and those looking to invest excess funds may not coincide in terms of time horizons, risk tolerances, expected returns/costs, or as regards particular contract dimensions.

In the traditional theory of financial intermediation, the nature of the information asymmetry between savers (sources of funds) and borrowers (users of funds) determines when direct versus intermediated exchanges will be feasible. Intermediaries play a role when the transactions costs of intermediated exchange (e.g. costs of search, bargaining, and contracting) are lower than the costs of direct transacting between market participants.

In the hypothetical perfect capital market, all transactions is direct and the organisation of economic activity, i.e. firms, institutions, and the location of economic agents, is irrelevant. There is a frictionless flow of capital. In such a market, contracts that cover all future contingencies can be concluded at no cost, such that all valuable investment opportunities are exploited optimally, and households can achieve optimal consumption smoothing and risk sharing over their lifecycle.

In reality, markets are not perfect and frictionless. Economic agents do not have identical information sets and capital is dispersed across many investors who have different time and risk preferences. And ownership of investment capital is separated from control.

An extensive literature has discussed the various arrangements in the financial system that address these departures from the ideal. The functions entailed include:

1. Facilitating the exchange of payments, both domestically and across borders;
2. Mobilising and pooling scarce and dispersed savings;
3. Monitoring investments to ensure adherence to the contracts that consumers and investors hold;
4. Facilitating the management of risks;
5. Producing information about potential investments and alternatives for allocating capital;

The result is a matrix of financial institutions, financial markets, and infrastructure support to perform these functions. The markets are the means by which financial claims of various kinds are exchanged between parties. They also provide the avenues by which financial institutions and their clients manage their financial risks. Financial institutions are major players in the financial system and are the entities on whose balance sheets reside many of the risks in the financial system. They include commercial/savings banks, credit unions, postal savings institutions, finance companies, insurance companies, invest-

3 See, for example, Allen and Santomero (1997) and Scholten and Wesveen (2000).
ment banks, collective investment schemes, pension funds and other institutional investors. Some institutions confine their activities to narrow areas and compete as specialists. Other institutions offer a more comprehensive range of products through a wide variety of distribution channels. Banks are the classic example of a multi-product financial intermediary and in most economies are the dominant players in the financial system.

3.2 The Special Role of Banks

Banks (and other intermediaries) are a solution to the information disparity between borrowers and savers. They also add value via diversification (i.e. expanding the investment choices available to savers and the sources of credit for borrowers, as well as the traditionally important role of management and diversification of risk) and by transforming financial contracts and securities of one form, maturity, etc. into another. Banks are notable among intermediaries for their role in helping to reduce the risks that funds are mismanaged, by monitoring investments more efficiently than individual savers would be able to do. As well, they are more efficient than individuals in allocating funds to their most efficient uses, given their superior information sets.

Banks have been at the core of the intermediation process. They offer a bundle of products and services and engage in activities that address most of the mismatches discussed above. The specific activities include safekeeping, scaling, searching, screening, contracting, monitoring, and enforcing.

1. **Safekeeping**: Banks offer a range of savings accounts to provide safety for the liquid assets of the public, accompanied by accounting statements that enable savers to keep track of their income and expenditures.

2. **Scaling**: Banks pool savings from many small savers in order to provide financing for large-scale projects.

3. **Searching and screening**: Banks collect and process large amounts of standardised financial information along with more specific information on the characteristics of individual loan applicants, which helps to avoid adverse selection and moral hazard risks arising from information asymmetries. This process also helps expand the investment choices available to savers and the sources of credit for borrowers.

4. **Contracting**: Banks set their loan terms according to the perceived risks of individual borrowers, levying higher interest charges and other fees on risky borrowers and using non-price terms to reduce the risk of default and mitigate other agency costs. These contract terms protect the bank’s interests but also those of its creditors.

5. **Monitoring and enforcing**: In addition to actively screening loan applicants, banks also monitor loan recipients to ensure compliance with loan covenants to reduce the risks that borrowed funds are mismanaged. Increasing returns to scale in monitoring mechanisms enable lenders to perform this activity more efficiently than individual savers would be able to do. That said, in the event problems are uncovered, lenders take enforcement actions to increase the likelihood of repayment by borrowers.

These activities are the basic ways in which banks add value to the economy. They offer products and services that map directly to the list of core functions of the financial system, as highlighted in Table 1.

<table>
<thead>
<tr>
<th>Core functions of the financial system</th>
<th>Core functions of banks</th>
<th>Related activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payments</td>
<td>Transactions accounts (redeemable in cash on demand)</td>
<td>Deposit taking</td>
</tr>
<tr>
<td>Pooling of funds</td>
<td>Transactions accounts Delegated monitor</td>
<td>Deposit taking Delegated monitor</td>
</tr>
<tr>
<td>Transfer of resources</td>
<td>Transactions accounts Providing liquidity services Delegated monitor</td>
<td>Deposit taking Delegated monitor</td>
</tr>
<tr>
<td>Management of risk</td>
<td>Transactions accounts Providing liquidity services Delegated monitor</td>
<td>Deposit taking Delegated monitor</td>
</tr>
<tr>
<td>Coordinating actions via prices</td>
<td>Delegated monitor Conduits for transmission of monetary policy</td>
<td>Lending Lending</td>
</tr>
<tr>
<td>Dealing with asymmetric information</td>
<td>Delegated monitor</td>
<td>Lending</td>
</tr>
</tbody>
</table>

Source: Authors’ extension of Merton[21], shown in first column.

The entire process evolves from how banks manage two sets of cash flows – loans and deposits. Collecting small denomination, withdrawable-on-demand deposits and transforming them into larger denomination, longer-term loans or using them in the mediation of various other credit, market and duration risks gives rise to two of the key activities of banks – liquidity provision and maturity transformation – which in the view of some researchers are what make banks “special” (Table 2).

Bank credit can help to bridge the gap between short-term funds and longer-term equity positions. Moreover, banks can provide such credit even in stressful situations, drawing initially on their links to other banks to access available liquidity through the interbank market and the reverse repurchase market, or through the issuance of large certificates of deposits. These exchanges of liquidity allow the direct and contingent credit facilities from banks.
individual entity. For example, Werner observes that in a stressed process, they create liquidity in the economy.

Huertas\(^{19}\) | Banks are special, as non-banks (individuals and institutions have their accounts at banks; banks have accounts at the central bank. Individuals and institutions therefore use banks to access the payment system. Banks lend to non-banks and provide the economy at large with a liquidity backstop.

Werner\(^{29}\) | Banks are different from non-bank financial institutions “because they can individually create money out of nothing.”

Gande and Saunders\(^{17}\) | Various scholars have argued that banks are special, due to the monitoring that they provide in connection with loans. However, other financiers (notably private equity firms) also monitor firms in which they invest or to whom they extend credit.

Olson\(^{25}\) | Significant increases in international capital flows among bank and non-bank entities, in addition to a broad range of specialized financial instruments, mean banks can no longer be considered the only source of transaction accounts. Except for their access to the Federal Reserve discount window, banks are no longer the dominant provider of liquidity for other financial industries. However, banks remain the key access point to the dominant wholesale payments network, and they still provide federally insured checking and savings deposits. With the rise of new financial services, products, and techniques, moreover, banks have expanded their role in providing liquidity in more indirect ways, for example, through securitization of loans and backup commitments to securitization vehicles and other capital-markets instruments. Even when banks may not be "special" or unique providers in a particular market, banks have proven themselves to be formidable competitors and innovators – which only reinforces banks' importance in the proper functioning of our financial system. In short, the public’s trust and confidence in banking continue to be vital to our financial well-being.

Calomiris\(^{6}\) | “The social value of banking arises from banks' specializing in information creation and contract enforcement (the so-called delegated-monitoring function of banks). Although this delegation makes it costly for outsiders to monitor the riskiness of bank assets, such intermediation is highly productive since it economizes on the costs of information and control by creating banks that specialize in these activities. ... The regulation of bank risk could be accomplished easily because deposit risk would be costlessly observable to everyone. But without asymmetric information, there would also be no need for banks, much less a bank safety net.”

Corrigan\(^{12}\) | Corrigan identifies three characteristics that distinguish banks from other types of financial institutions. These characteristics have to be jointly present for a bank to be considered “special”: 1) offering transactions accounts redeemable in cash on demand; 2) serving as the backup source of liquidity for all other institutions and individuals; and 3) as conduits for the transmission of monetary policy to the broader economy.

Source: Authors’ assessments.

<table>
<thead>
<tr>
<th>Source</th>
<th>Factors that make banks special</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boot and Thakor(^{1})</td>
<td>The first raison d'être for banks relates to their capacity as information processors and delegated monitors, and these aspects are primarily related to the management of credit risk. The second raison d'être relates to the provision of liquidity. Banks invest in illiquid assets but finance themselves with highly liquid demand deposits, and through this intermediation process, they create liquidity in the economy.</td>
</tr>
<tr>
<td>Huertas(^{19})</td>
<td>Banks are special, as non-banks (individuals and institutions have their accounts at banks; banks have accounts at the central bank. Individuals and institutions therefore use banks to access the payment system. Banks lend to non-banks and provide the economy at large with a liquidity backstop.</td>
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</tr>
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</table>

6 The financial safety net is only as strong as the public authorities backing it.

even though no such deposit had taken place. As a result, a bank “can individually create money out of nothing”.

Be that as it may, if the money created is not completely misallocated, the economy benefits from this additional financing and thereby from the maturity transformation between banks’ risky assets and their “safe” liabilities. That said, in times of stress, fears on the part of depositors about the safety of their funds can result in “runs”, whereby numerous depositors attempt to withdraw their funds at the same time. The same adverse events are also likely to prompt draws against the binding liquidity commitments banks have made. This sudden mismatch between assets and liabilities, the core of the fragility problem of banks, can result in rapid outflows.

Banks hold buffer stocks of liquid assets to handle unanticipated outflows, but while they bear all the costs of the buffer, they do not capture all the social benefits and, hence, may not always have incentives to hold enough. In the event a bank’s liquidity buffer falls short, it is forced to find liquidity elsewhere, either by borrowing in the interbank market or by selling assets. Either option can prove elusive. For example, selling assets in a stressed market environment to meet short-term liquidity demands risks getting prices well below the assets’ intrinsic quality,
which can worsen rather than ameliorate an institution’s problems (i.e. on account of the implied hit to capital).

Moreover, both fire sales of assets and the failure of the bank can have spillover effects on other financial institutions and the broader economy, which result at least in part from accompanying contractions in credit availability. It is this externality that creates a role for policy.

The role intermediaries play in an economy influences the relative weight assigned to them and their products and services in the overall regulatory framework and the financial sector is special compared with many other sectors of the economy. It faces a greater risk of instability, both at the level of individual financial intermediaries and markets and at the level of the overall financial system. For similar reasons, banks are special among intermediaries. Most governments provide support for the liquidity and sometimes even the solvency of banks to reduce the likelihood of panic and the spread of the difficulties to the real economy. Functioning under this support structure has been the privileged position of banks.

### 3.3 Digital Channels of Financial Intermediation

In periods of rapid change in the provision of financial services, one can lose sight of the fact that the basic needs being met remain more or less the same. In this context, retail clients still have a need for some type of current account, for loans to finance large purchases and investments, for financial advice, and for remittance capabilities and money transfers. What is changing, from the viewpoint of the end-users, is how the needs are met.

Banks have traditionally provided a bundle of products and services, often without being the low-cost provider of any of them. Operating under the shelter of the FSN, banks could rely on the stickiness of their retail client base, which had a strong preference for safety of their deposit funds and stayed with their existing provider, often even when better terms were on offer elsewhere, trading off security and on-demand access for higher returns. Hence, banks have been the primary repositories for the savings of the retail public.

In the expanding digital space, that close link between a bank branch and the saving/borrowing public has begun to loosen in favour of digital interfaces. The channels through which funds flow from sources of funds to users are being altered by the new digital technologies and related services, which replicate some of the functions typically performed by banks, including liquidity provision, credit intermediation, foreign exchange operations and especially payments services. The question arises as to whether banks will continue to control the current account as the primary interface with the retail banking clientele.

The answer depends in part on the relative importance to customers of the bundle of services provided by banks versus the unbundled equivalent available separately.

Digital banking initiatives are performing several retail banking functions, although available evidence indicates that the distribution of initiatives across functions is unequal. For example, a recent stock-taking of the Fintech landscape in France suggests that funding, payments and foreign exchange operations are particularly affected, if judged by the number of Fintech entities [28]. As of end-2017, 285 Fintech entities were identified, with the majority related to a narrow subset of functions traditionally performed by deposit-taking banks.

Looking across a broad range of jurisdictions, one finds different operational models, technology employed, product features, and entities. Three common types of initiatives in the payments, clearing and settlement, credit, and deposit categories include digital or mobile banks, mobile wallets, and peer-to-peer (online) platforms.

### 3.4 Digital Banks and Related Initiatives

In the mid-2000s, references to digital banks typically referred to online banks launched by traditional banks, which were aimed at those customers drawn to the flexibility of remote banking relationships and the more attractive pricing it offered. These days, the “digital bank” label applies to a range of initiatives that make extensive use of technology (e.g. via smartphone apps or internet-based platforms) to offer retail banking services, including current and deposit accounts, credit cards, financial advice, and loans. The entities take various forms depending on the products offered and the laws of the resident jurisdiction. For example, some jurisdictions limit ‘deposit-taking’ to entities specifically licensed as “banks”. Where that is the case, a digital bank must be an entity in possession of a banking licence, with all the requirements this entails. Digital banking initiatives in this context can take different forms. They may be stand-alone entities or subsidiaries of existing banks or even of non-financial companies, where rules permit. Table 3 provides a side-by-side comparison of three different digital banking initiatives (to be distinguished from licenced banks) to illustrate some of the differences in the structure and operations of mobile banking entities.

The “digital bank” label is sometimes misapplied to entities that are not, strictly speaking, banks, although they may offer some traditional banking products and services. Mobile banking entities in this category offer a fully modernised and fully digital relationship model, often based on big data technologies and advanced data analytics. Being fully digital means they are unencumbered by legacy in-
Distributed infrastructure, which enables them to adopt and employ new technology at lower cost and more rapidly than incumbent institutions and in a more modern format. Such mobile banking entities typically target individuals, entrepreneurs and small to medium-sized enterprises, particularly those customers that have not been served by traditional banks, such as the unbanked and the underbanked.

Mobile banking entities may link their operations with scalable infrastructure through cloud providers or API-based systems to better interact through online, mobile and social media-based platforms.

### 3.5 E-Wallet

Another category of digital service provider in the payments, clearing and settlement category is the mobile wallet or eWallet for short. The eWallet is an innovative payment mechanism most often executed by use of a connected device such as a smartphone. Many mobile wallets have been developed by third-party technology companies and include Apple Pay⁷, Samsung Pay, and Android Pay as common examples, but others have been launched by the likes of MasterCard, Alibaba, and Tencent.

Digital wallets allow money to be withdrawn on demand and at par or to be transferred on demand to another eligible account. The funds in such digital wallets in turn could in principle be invested in risky, longer-term fixed-maturity and/or illiquid assets. In this case, the digital wallets would engage in maturity, liquidity or credit risk transformation, although they would not be covered by commensurate prudential regulation. As a general rule, funds are required to be held in safe assets. For example, in the European Union (EU), the E-Money Directive requires e-money providers to invest the funds of digital wallets with transaction functions in bank deposits or fairly safe assets such as government bonds. So far, digital wallets are not systemically important. Despite considerable and perhaps even increasing competition in this area,

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Table 3. Features of selected financial service providers in the areas of deposits, payments and credit (free retail accounts in France)

<table>
<thead>
<tr>
<th></th>
<th>Orange Banque</th>
<th>Revolut</th>
<th>N26</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deposit-taking</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank charter</td>
<td>YES (France)</td>
<td>NO (e-wallet, United Kingdom)</td>
<td>YES (Germany)</td>
</tr>
<tr>
<td>Offering transaction accounts</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Taking deposits</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Deposit protection</td>
<td>Deposit insurance (Fonds de Garantie des Dépôts et de Résolution)</td>
<td>Segregation (Segregated Revolut account at Barclays Bank)</td>
<td>Deposit insurance (Compensation Scheme of German Banks)</td>
</tr>
<tr>
<td>Organised as resident bank</td>
<td>YES (France)</td>
<td>NO</td>
<td>YES (Germany)</td>
</tr>
<tr>
<td>Subsidiary of other firm/bank</td>
<td>YES (non-financial firm Orange)</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Branch of other firm/bank</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td><strong>Payments</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payment provider</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Credit card</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Debit card</td>
<td>YES (with Visa)</td>
<td>YES (with Visa)</td>
<td>YES (with MasterCard)</td>
</tr>
<tr>
<td>Receive bank transfers</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Recurrent payments</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Domestic transfers</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>International transfers</td>
<td>YES</td>
<td>YES (in 26 currencies)</td>
<td>YES (in 19 currencies with partner TransferWise)</td>
</tr>
<tr>
<td><strong>Lending</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making loans</td>
<td>YES</td>
<td>NO</td>
<td>YES (with partner platforms)</td>
</tr>
</tbody>
</table>

**Note:** This table does not take into account the potential implications of the announcement on 13 December 2018 by Revolut (see blog.revolut.com; retrieved on 15 January 2019) that the ECB has approved the company’s application for a European banking license. That announcement states “nothing is going to change right away”.

**Source:** Authors’ assessments

⁷ Apple Pay is a mobile payments scheme largely used offline in a physical store, or for transit. PayPal, by contrast, is a digital payments scheme, used to shop online and in apps and via a mobile browser with mobile devices.
network effects could imply that one financial service provider comes to dominate specific markets.

Most e-Wallets are offered in conjunction with a partner bank, in a distributed bank scenario, whereby the bank in question offers third-party wallets. In contrast, some banks have developed mobile wallets in-house.

### 3.6 Marketplace Platforms (Peer-to-peer, Online, Mobile platforms)

Lending platforms are another digital-based means of facilitating financial retail transactions. Automation of lending processes is achieved through the setting of lending criteria in terms of risk, maturity, amounts, etc., resulting in transactional costs of financial intermediation below those of traditional banks. Lending platforms use alternative sources of data and scoring models to evaluate credit applications. Such data could include utility payments, rent payment history, insurance claims, use of mobile phones, social media, sales data, or other personal data of consumers that traditional banking organizations may not typically use.

Some commentators claim that the use of alternative sources of data may result in expanded access, a faster turn-around of credit decisions, convenience, and reduced costs, which succeeds not only in reducing the cost of funding to usual borrowers but also in expanding credit access, particularly for the unbanked and the underbanked.

Others point out that more analysis is needed to determine whether alternative sources of data are better than traditional sources or instead more prone to errors and inaccuracies, and whether they may create unfair disadvantages for consumers and lead to disparate impacts and violations of fair lending rules. It is essential for the new financial service providers, like traditional lenders, to ensure the security of the collection, use and disclosure of personal and sensitive consumer information in order to avoid the potential harm to consumers of a data breach and any privacy law violations.\(^8\)

Many countries have set up specific regulation applying to either one or both types of platforms. Country-specific regulatory approaches were reviewed by the Financial Stability Board and Committee on the Global Financial System (CGFS/FS, 2017), and, for Europe, by the European Stability Board and Committee on the Global Financial Stability.

While all platforms are similar in the sense of connecting lenders and borrowers directly, various types of contracts are involved. Havrylchyk proposes a classification based on a taxonomy developed by the Cambridge Centre for Alternative Finance, which is used in Table 4 to list and categorize selected platforms.

#### Table 4. Examples of activities of selected lending platforms

<table>
<thead>
<tr>
<th>Broad type of financial contract</th>
<th>Entities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit to consumers</td>
<td>Zopa and Ratesetter in the United Kingdom, Prosper and Lending Club in the United States, Bondora in Estonia</td>
</tr>
<tr>
<td>Credit to SMEs</td>
<td>Funding Circle in the United Kingdom, Geldvoorelkaar in the Netherlands, Lendix and Unilend in France</td>
</tr>
<tr>
<td>Property-secured lending to property developers</td>
<td>LendInvest in the United Kingdom, Investly in Estonia</td>
</tr>
<tr>
<td>SMEs sale of invoices to investors</td>
<td>MarketInvoice in the United Kingdom, Investly in Estonia</td>
</tr>
<tr>
<td>Investments in sustainable development</td>
<td>Lendosphere in France, Abundance in the United Kingdom</td>
</tr>
</tbody>
</table>

**Source:** Adapted from Havrylchyk\(^{[18]}\), based on the taxonomy developed by Cambridge Centre for the Alternative Finance.

As these examples suggest, digital banking initiatives are performing a number of retail banking services (Table 5). Some initiatives focus on activities that would be more likely to attract only certain groups of customers, such as younger populations who embrace technology and are less averse to switching providers and international populations (e.g. ex-pats) who have a need for cross-border payment services. However, other initiatives, namely those providing basic safekeeping and transactions accounts, offer products and services that comprise the initial components of the typical financial retail customer interface, which often serves as the gateway to the associated full value chain.

#### Table 5. Core functions & activities of banks and FinTech initiatives

<table>
<thead>
<tr>
<th>Core functions/activities of banks</th>
<th>Functions that make banks “special” under the FSN</th>
<th>Functions of digital banks and other FinTech initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safekeeping (deposit taking)</td>
<td>Safekeeping (deposit taking)</td>
<td>Safekeeping (eW), Deposit taking (DB)</td>
</tr>
<tr>
<td>Offering transactions accounts (redeemable in cash on demand)</td>
<td>Offering transactions accounts (redeemable in cash on demand)</td>
<td>Offering transactions accounts (DB, eW)</td>
</tr>
<tr>
<td>Liquidity provision</td>
<td>Liquidity provision</td>
<td>Liquidity provision (DB, eW)</td>
</tr>
<tr>
<td>Maturity transformation</td>
<td>Maturity transformation</td>
<td>Facilitating the exchange of payments DB, eW, API</td>
</tr>
<tr>
<td>Clearing and settling transactions (payments)</td>
<td>Clearing and settling payments</td>
<td></td>
</tr>
</tbody>
</table>

---

\(^8\) For example, New York State’s Department of Financial Services released a report recommending additional regulations for online lenders, which emphasizes that existing consumer protection laws and usury limits apply equally to online lenders as well as chartered institutions. Reportedly, “Financial Services Superintendent Maria T. Vullo noted that borrowers, whether consumers or small businesses, require protection, and banks deserve a ‘level playing field’”. See New York Department of Financial Services at https://www.dfs.ny.gov/reportpub/online_lending_survey_rpt_07112018.pdf.
Serving as conduits for transmission of monetary policy

<table>
<thead>
<tr>
<th>Financial risk management</th>
<th>Financial risk management (DB, eW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pooling</td>
<td>Pooling (P)</td>
</tr>
<tr>
<td>Underwriting (credit assessment)</td>
<td>Credit scoring (P)</td>
</tr>
<tr>
<td>Matching</td>
<td>Data aggregation (API)</td>
</tr>
<tr>
<td>Scaling capability</td>
<td></td>
</tr>
<tr>
<td>Delegated monitoring</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ assessments.
Notes: DB = digital bank; eW = eWallet; API = automated programming interface; P = online platform.

4. Exploring Linkages between Digital Banking Initiatives and Banks

4.1 APIs and the Positioning of Fintech Initiatives Relative to Incumbent Banks

Taken as a group, digital banking initiatives overlap several of the activities and functions that banks provide in the retail market segment. A point that may not be readily apparent in the descriptions of selected digital banking initiatives is that bank accounts are often still part of the intermediation process, especially as regards many digital payment methods. Banks are involved in such digital initiatives in numerous ways, both directly and in partnership with other entities.

One structure that is becoming a more common approach in the digital transformation of banking services is the use of application programming interfaces (APIs) to link banks’ own infrastructures to innovative digital products developed by third-party developers. APIs allow for the automatic transfer of funds from one account to another.

The use of APIs has clearly been encouraged by regulatory initiatives such as the second European Payments Services Directive (PSD2) and by “open banking” initiatives introduced or under consideration in various jurisdictions, such as the United Kingdom. But many large banks appear to have settled on their use independently, as part of their own digital transformation. The exact nature of the embedded protocol varies depending on the particular application but, in general, the API specifies all the components necessary to perform the intended interaction, including who is allowed access and the format used in the exchange, the underlying data and the type of connection required to enable the particular function or operation to be conducted.

The details obviously matter but, for the purposes here, it suffices to state that APIs are becoming the primary mechanism by which banks enable third parties to develop applications that run on top of their infrastructure to link to their client bases. The nature of the access granted and how it is priced and the function of the API in the structure are keys to understanding what role if any the banking licence plays in the relationship.

4.2 Other Collaborations between Digital Banking Initiatives and Incumbent Banks

The positioning of digital banking initiatives within the banking ecosystem varies, but many initiatives increasingly operate within the framework of a partnership with established players. Collaborations between banks and Fintech initiatives take various forms, including contractual relationships, partnerships and acquisitions. For example, Figure 1 distinguishes between four types of interactions between traditional banks and lending platforms. These are:

1. for banks to provide specific operational services to the platforms, such as payment and settlement services and custodial services;
2. for banks to originate loans on the behalf of lending platforms;
3. partnership agreements that, for example, require that borrowers denied credit from a bank are referred to lending platforms;
4. direct investments.

Figure 1. Positioning of new players in relation to incumbents

Source: Autorité de Contrôle prudentiel et de resolution.
Incumbents might acquire Fintech entities for strategic reasons and to complement their own portfolio of services offered or providing similar services at lower costs. One motivation might also simply be “If you can’t beat them, buy them.” An overview of selected Fintech acquisitions by banks is provided in Table 6.

According to some consultancy reports, a new strategy is for incumbents to acquire digital applications or entities in their early stage (start-ups) and develop their own Fintech arrangements in-house. In April 2018, Santander announced that it had launched a cross-border payments system based on blockchain, using that technology with a view to competing with payment services such as TransferWise. The system, called One Pay FX, was developed over two years and uses distributed ledger technology developed by California-based Ripple, in which Santander’s InnoVentures venture capital fund had invested in 2015. In other developments also involving US blockchain specialist Ripple, a few Japanese banks have started offering customers free, real-time money transfers via new mobile apps.

4.3 Direct Establishment of Digital Banking Initiatives by Banks

An alternative to acquisition of Fintech start-ups by banks is the establishment of their own in-house initiatives. In the past, circa the mid-2000s, digital transformation by banks mainly implied the launch of an online bank, which fulfilled the needs of those customers tempted by the flexibility of remote customer relationships and attractive pricing policies. Today, most French banking groups have a banking solution that is fully remote (online, via mobile or via telephone). Those banks that until recently did not offer this service have decided to launch their own offering, as they have become increasingly aware that a fully remote solution attracts certain groups of people (i.e. young and international populations or people who would be likely to switch providers).

The tightening of the regulatory and supervisory framework, especially for large and complex banks, might explain the timing by which incumbent or traditional banks have participated in digital initiatives. Discussion in the trade press suggests that banks’ IT budgets are stable over a period of years and initially the regulatory tightening was reflected in banks allocating IT investments in a way that facilitated their compliance with the new regulation. Once these new systems were in place, banks started to allocate IT investments more towards new initiatives that would support revenue-generation further down the road.

In this context, banks in many jurisdictions have begun to develop their own mobile applications, although in some cases significant investment is still required to further improve application ergonomics and enhance functionality beyond the most basic operations. At a minimum, banks are endeavouring to retain their relationship with customers and remain their first financial partner, by offering a broader range of products and services to serve customers over the long term. Maintaining control of

<table>
<thead>
<tr>
<th>Artificial intelligence</th>
<th>White label banking</th>
<th>Lending/credit</th>
<th>Online banking</th>
<th>Payments</th>
<th>Personal financial management</th>
<th>Pricing tool</th>
<th>Real estate</th>
<th>Student loan refinancing</th>
<th>Trading</th>
<th>Wealth</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBVA Compass</td>
<td>Simple Holvi</td>
<td>Openpay</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Madiva</td>
</tr>
<tr>
<td>Goldman Sachs</td>
<td>Finance/ Final</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HonestDollar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNP Paribas</td>
<td>Compte Nickel</td>
<td>LevelMoney</td>
<td></td>
<td></td>
<td>PARIBUS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital One</td>
<td>MCX wepay</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JP Morgan Chase &amp; Co.</td>
<td>TRADE: Plus</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ally</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TradeKing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit Suisse</td>
<td>TRADE: Plus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Republic Bank</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gradifi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silicon Valley Bank</td>
<td>Standard Treasury</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TD Bank</td>
<td>LAYER6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ assessments and CBInsights [9], https://www.cbinsights.com/reports/CB-Insights_Banks-In-Fintech-Briefing.pdf

DOI: https://doi.org/10.30564/jesr.v3i1.1113
everyday payment and banking services is central in the battle for customers, as reflected in the establishment of digital banks by most incumbent institutions.

5. Examining Financial Safety Net Trade-offs Related to Digital Banking Initiatives

5.1 Deposit-taking and Maturity Transformation

Some banking activities require the backing of the FSN if private intermediaries are to perform them. Deposit taking and maturity transformation are the two types of activities of banks that are linked to most of their own and the financial system’s core functions (see Table 5). And it is the performance of these activities that explains why the provisions of the FSN protect banks.

Maturity transformation (i.e. taking deposits and on lending) is necessary to ensure that the system has an adequate supply of liquid funds, and the current sys-
tem of fractional reserve banking fundamentally relies on banks producing adequate supplies of money. Other sys-
tems have existed at different points in time and proposals have been made to reconsider the current system.9

The lender-of-last resort function and, to some extent, the deposit insurance function are meant to avoid “runs”. Any financial intermediary, and not just commercial banks, performing maturity transformation is subject to “runs”. While “runs” on insolvent financial firms can be efficient or not, runs on illiquid but solvent firms are always inefficient as long as there are transaction costs in-volved in the resolution of a failing financial firm. In fact, a market failure arises because of asymmetric information and the initial normative function of the lender of last re-
sort was to provide support to solvent but illiquid banks in the face of liquidity shocks, associated with their traditional business model of taking deposits withdrawable on demand and lending out the funds over longer-term fixed periods.

The deposit insurance function primarily protects de-positioners while the lender-of-last-resort function primarily protects the system (although in doing so it also protects depositors as well as other end-users of the financial sys-
tem).

There are, however, some important caveats to the provision of both the lender-of-last-resort and the deposit insurance functions. First, access to these provisions of the FSN are counterbalanced by additional restrictions imposed by a bank regulatory framework, implementation of and adherence to which is enforced by supervision. The regulatory and supervisory functions are the quid-pro-
quo for access to the deposit insurance and lender-of-last resort functions. Second, out of concern that the safety net does not become overextended, policy makers have not only limited the extent of deposit coverage but have also limited deposit taking to a limited set of institutions. The set includes commercial banks and, in principle, entities licensed to provide related commercial-bank-like func-
tions.

The recent global financial crisis served notice that the dimensions of the regulatory framework cannot fo-cus solely on microprudential concerns but, rather, must also entail a macroprudential approach. To be effective in maintaining financial stability it is not sufficient to focus on the safety and soundness of an individual institution, but also to consider the level and distribution of risk at the aggregate level, given the close interconnections among banks through interbank claims, derivatives transactions, and similar portfolio compositions. These interlinkages are not stable over time; they change as part of the dy-namic nature of the financial system. New and emerging financial technologies are among the factors transforming the nature and extent of these interlinkages.

The crisis also made it clear that the speed of resolution is also a key issue in restoring calm and that traditional corporate insolvency rules are ineffective when it comes to ensuring that failure resolution of a large financial firm does not precipitate a contagious collapse of the system. Hence, while resolution frameworks for banks were in the past linked mainly to deposit insurance, more recently, a wider set of arrangements has been adopted to ensure smooth and efficient exit of large financial firms.

One new element concerns the function of the guaran-
tor-of-last-resort, which was introduced de facto10 as part of the financial safety net as part of the policy response to the global financial crisis. It consisted of assurance to financial market participants that the safety of the liabili-
ties (and sometimes even assets) of financial intermediar-
ies would be guaranteed by public authorities to avoid a potential “run” on banks by counterparties and creditors. Policy makers in some jurisdictions announced that bank

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9 In Switzerland, a recent popular referendum on a proposal to make the Swiss National Bank (SNB) the sole issuer of money and end the traditional system was rejected on Sunday, 10 June 2018. Over 75% of Swiss voters rejected the Initiative “For crisis-resistant money: end fractional-reserve banking (Vollgeld)”. The proposal contained several elements. Financial institutions could manage transactional accounts for customers but must hold equivalent assets with the Swiss National Bank. Commercial banks would have been prevented from “creating” money when issuing loans, thus effectively ending fractional reserve banking, under which only a fraction of deposits held by banks on behalf of customers are backed by notes and coins or banks’ deposits at central banks.

10 One can argue that it was always more or less present, given that many governments have stepped in to provide guarantees when faced with systemic banking problems.
deposits would be protected without limits, Ministries of Finance set up various funds to protect specific types of financial firm liabilities (and in some cases also assets), and central banks gave assurance that central bank liquidity would always be ample).

In discussing the initial policy response to the global financial crisis, the OECD Committee on Financial Markets opined that the addition of the guarantor-of-last-resort function was perhaps necessary to avoid a worst-case outcome but noted that this response was not costless. The costs include the perception that some banks are so “special” that their debt is implicitly insured by public authorities, which means they are unlikely to be forced to exit the market, at least not in an uncontrolled way. Current financial regulatory reform explicitly aims to reign in such expectations, although one can ask how successful that exercise will prove to be.

5.2 Deposit Insurance and Digital Banking Initiatives

5.2.1 The Customer Perspective

Where deposit insurance exists in sufficient coverage amounts, it largely eliminates the contagion effect where-by depositors flee the system when an unaffiliated institution is in trouble. It also substantially reduces their incentive to flee their own institution in times of trouble. This protection has its obvious benefits in the sense of helping to maintain calm, but it also has potential drawbacks.

The primary drawback of the safety net is “moral hazard”. The risk is particularly acute in the case of deposit insurance. History suggests that in order for a deposit insurance system to succeed as a stabilising mechanism, it must cover a sufficiently high monetary value of deposits to remove the incentive for depositors to run at the sign (or perception) of problems. But once the coverage amount becomes high enough to remove the incentive for depositors to run, it has the potential to create incentives for banks either to hold less than the socially optimal level of liquid reserves or, worse, hold an excessive amount of risky assets. In short, there is a trade-off between the ability of a deposit insurance system to prevent runs on banks and the soundness of the incentives it gives to depositors and bank managers.

As with most policy trade-offs, there is no obvious place where to draw the line between too much and not enough coverage. Most governments have proceeded by creating a deposit insurance system to maintain the confidence of depositors in the banking system, but they have accompanied it with various design elements such as up-front pricing to avoid or minimise negative side effects.

Responsibility for paying for deposit insurance coverage rests, in principle, with banks, as they and their clients are the direct beneficiaries of an effective system. But the likelihood of a deposit insurance payout is not evenly distributed among banks, being higher in the case of financially weaker institutions. If participation in the system is voluntary, it is the higher-risk banks that have the greater incentive to opt-in, while stronger, lower-risk banks would have less incentive to participate; hence, the reference to adverse selection.

The potential for uneven burden sharing can arise whenever the risks to the system posed by covered institutions are unbalanced across the pool. As a general rule, the deposit insurer will want to monitor the portfolio decisions of member banks to ensure that the system is not exposed to unacceptable risk. Even an incentive-compatible deposit insurance scheme needs to be supported by appropriate regulatory and supervisory practices to ensure that banks adhere to high capital adequacy standards, observe proper market conduct, and are fair and honest in their dealings with clients and customers. Monitoring is most easily accomplished when all participants operate under the same regulatory regime, with a similar approach to prudential supervision and oversight.

In some deposit insurance systems, the ability of the deposit insurer to control the risks the system assumes is facilitated by granting the deposit insurer control over entry criteria for membership in the system. But in other systems, membership in the deposit insurance scheme is granted automatically upon a depository institution’s receipt of a banking licence or is instead a condition for receiving the licence.

This discussion on eligibility for deposit insurance coverage is relevant for the topic at hand. For instance, should accounts at digital banking initiatives be covered by the traditional deposit insurance system? On the one hand, the desire to ensure adequate protection for retail investors supports covering all retail “deposits”, including those held at digital banking initiatives. But on the other, many digital banking initiatives lack a banking licence and are not subject to the same form of regulation as existing member banks. Including them in the deposit insurance pool could expose the deposit insurance system to unfa-
miliar risks.

To decide which hand is chosen requires a better understanding of what type of account we are addressing. As part of the digitalisation of retail finance, both incumbent banks and new entities use new financial technologies to provide specific financial services that were previously provided in bundled form by banks, or they provide altogether new financial services. Many of these services are in the payments area.

Table 7. Maturity transformation and liquidity provision services provided by different institutions (Example using US institutions and regulations)

<table>
<thead>
<tr>
<th>Entity</th>
<th>Execution: …by offering…</th>
<th>Financial safety net access?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks</td>
<td>Passbook savings accounts</td>
<td>FDIC insurance</td>
</tr>
<tr>
<td>Banks</td>
<td>Certificates of deposits (CDs) &amp; small time deposits</td>
<td>FDIC insurance</td>
</tr>
<tr>
<td>Thrifts</td>
<td>Other deposit and “interest-bearing products”</td>
<td>FDIC insurance</td>
</tr>
<tr>
<td>Investment banks &amp; thrifts</td>
<td>Money market mutual funds, offering interest rate and immediate withdrawal at par or payable-through drafts</td>
<td>No, at least not explicitly</td>
</tr>
<tr>
<td>Fintechs, Tech-fins, payment service provider</td>
<td>e-wallet, offering returns on assets and allowing transfers</td>
<td>No, at least not explicitly</td>
</tr>
</tbody>
</table>

Note: “Entity” either identifies the financial intermediary that incurs a liability on its own balance sheet as a result of the execution of the economic function or in cases where there is no such liability it specifies “security”.

Source: Authors’ assessments.

5.2.2 The Provider Perspective

The provision of services related to payments, including money transfers, and foreign exchange transactions, has historically been the province of banks, given their front-end relationships with customers, their links to other banks via the inter-bank market, and their direct access to central bank facilities. Depending on the nature of an institution and the jurisdiction in which it operates, a bank may offer various types of transactions accounts, giving account owners often-immediate access to funds and enabling them to transfer funds to third parties in a variety of ways – for a fee.

The current account is often the main interface between retail customers and banks. It bundles together several services, including safekeeping, payments and transfers, and short-term credit in the guise of overdraft protection, and sits at the core of banks’ efforts to cross-sell more advanced products and services over time to the retail segment. This arrangement – based on long-term relationships between consumers and service providers – has long been the essence of the retail market segment.

New digital banking initiatives seek to unbundle these services into separable components. As noted by Mark Carney, Governor of the Bank of England, “FinTech’s true promise springs from its potential to unbundle banking into its core functions: settling payments, performing maturity transformation, sharing risk and allocating capital…” Their eventual success, especially in terms of scale, will depend not only on unbundling the products and services but also on unbundling the retail customers from their existing banks.

The conventional view is that banks tend to specialise in lending to customers for whom adequate information on payment histories is lacking, a category that includes individuals and new and small businesses. But there is a caveat. Banks have economic incentives to invest in such customers if they can develop long-term relationships with them that enable the banks to recoup the costs of the initial investment in information gathering. In the case of small businesses, costs would also entail nurturing the firms along. For banks, the true benefit from the relationship accrues over time to the extent they can extract surplus rents through subsequent lending to the customer or through additional fee-generating business as the customer relationship matures.

The benefits of these banking relationships are not necessarily one-sided, however, if the underlying information asymmetry persists. Retail customers may benefit from the maintenance of a long-term relationship with a given service provider, the capitalised value of which may be sacrificed if they switch to another institution that does not know them as well. The rationale in this case is the potential adverse selection problem the new service provider faces. Because the existing relationship is based on privileged information, a new institution would not know in advance the quality of a prospective client. Owing to this information asymmetry, a high-quality customer attempting to switch from an institution with which it has an established relationship to a new provider may initially encounter unfavourable terms – those typically offered to lower quality customers.

The presumed information problem is used to explain why retail customers tend to stick with a given service provider, even when better value products are available elsewhere. Retail customers appear to value a good reputation and the perception that an institution is safe more highly than the savings from lower fees and prices available elsewhere. Ultimately, they become, in effect, “locked in” with their existing service provider and are likely to never switch to a new provider if they remain in the same local vicinity.
Viewed from the perspective of alternative service providers, the existence of inelastic demand curves arising from this behaviour of retail consumers is a type of market entry barrier. What advantage is there for an institution to invest in technology to become a low-cost provider of a given product or service if consumers prefer long-term relationships with their existing provider and are relatively insensitive to price? If customers find it costly to switch from one service provider to another for whatever reason, then the existing service provider gains, at least in principle, a measure of market power over customers with whom it has an established relationship, which also provides some protection against rival providers.

The existence of high switching costs in the retail market segment continues to be a major concern in competition policy circles, where a decided preference exists for market configurations that enable consumers to switch readily from one service provider to another (e.g. flexible distribution channels). These configurations have the potential to offset (somewhat) the otherwise conservative tendencies of retail customers.

This reasoning explains the rise in open banking initiatives in several jurisdictions, which aim to foster competition and innovation by opening up access by third parties to bank customer data, albeit with explicit consent by the customer, and allowing customers to use third parties for payments-related services. Such third parties could include other banks, small and large technology firms and new payment providers.

5.2.3 The Interface between the Retail Customer and Service Provider

At a micro level, retail consumers of financial products and services have idiosyncratic information endowments (i.e. what they know) and therefore needs (i.e. what they should know), reflecting their individual circumstances and risk preferences. These individual characteristics carry through to the behaviour of financial consumers, which can differ across such demographic characteristics as age and gender, and income levels, while culture and related social factors are also relevant in some contexts. These differences are reflected in the uptake of digital banking initiatives, where for example estimates suggest that customers in the 25- to 44-year-old age bracket show the most comfort with Internet and mobile technologies and are the early adopters of new digital banking offers. Uptake tends to decline for customers aged 45 years and older.

The younger, presumably more digitally savvy demographic segment is more drawn to digital financial services, given the added convenience, increased transparency, and availability of offerings that are more tailored to their more mobile, digital-based existence. In contrast, customers in the older demographic group are more likely to be involved in a long-term banking relationship with an existing provider and to perceive that loyalty carries benefits or simply that switching entails risks. For these customers, trust is likely to be gained only if they are confident that the same level of protection is available no matter which type of entity—branch-based or digital entity—is providing the financial services.

The benefits of digital banking innovations for customers can include a superior and seamless customer experience, a wider range of products and services at a lower cost and potential for access to financial services for underserved customers (such as some SMEs) or the underbanked. But for safekeeping of funds, safety first seems to apply and for many retail savers that appears to mean deposit insurance.

If security of the funds remains an indispensable aspect of digital retail banking services, as is the case for traditional arrangements, then in the absence of formal deposit insurance some other safety mechanism needs to be part of the digital banking solution. A fundamental question is whether a solution exists that provides an equivalent degree of safety without destroying the economic viability of the arrangement. If a cost-efficient solution does exist, a second question that arises is whether it is scalable.

Data limitations make it difficult to address this issue directly. But one can draw inferences from anecdotal evidence. For example, many providers of digital banking initiatives that began as non-bank entities subsequently acquired or applied for a true banking license, which can bring eligibility for deposit insurance coverage.

Table 8 shows features of selected digital banking initiatives that have applied for a banking license. Although the specific financial services provided by each entity are different, current accounts with a payment (mostly debit) card are provided in several instances.

Other anecdotal evidence consistent with the importance of access to deposit insurance protection for digital banking initiatives is implicit in the communication strategies of new digital banks. Several digital banks are generally known to place a sharp focus on the interaction and communication they maintain with (voluntary) designated digital bank “communities”, which allow bank management to obtain direct feedback from the users of their

14 Competition policy is motivated not only by the desire to protect consumers from detriment associated, for example, with mispricing on the part of service providers, but also with a view towards ensuring market forces work to enhance the efficiency of allocation within the financial sector and between the financial sector and the rest of the economy.
products and services. The existence of deposit insurance coverage for the banks’ current accounts, where they exist, is prominently featured in the promotional material the banks disseminate to advertise their product.

5.2.4 Automated Programming Interfaces

An alternative to the direct approach to deposit insurance coverage is the use of contractual arrangements to innovate around the regulatory restrictions on access. One strategy that has been employed in several arrangements involves a contractual agreement between the digital banking initiative and a traditional bank. Many Fintech initiatives do not involve holding clients’ money themselves, but instead pull money from clients’ current or credit card accounts. To the extent that they do hold customer funds, however, “e-money” regulations require the funds to be invested in liquid assets such as bank deposits or government bonds, so that any liquidity mismatch is limited. An example is Revolut, which offers an e-wallet to hold, exchange and transfer fiat currencies, as well as cryptocurrencies via the Bitstamp cryptocurrency exchange, although a premium as opposed to standard account is required for customers to access services related to cryptocurrencies.

In principle, deposit insurance applies to fiat currencies only and is typically restricted to legal domestic tender, but a smart contract can be used to automate transactions and processes, possibly shifting funds in and out of the perimeter of deposit insurance on demand, which allows the funds to benefit from deposit insurance while held at the bank (Figure 3).

Many financial technology initiatives can be developed in this way. An example is discussed by Latimore and Greer [20], who in describing a Bitcoin platform suggest: “With Bitcoin.de, Fidor realized an API-supported real-time settlement process that allows Fidor customers to trade their Bitcoins instantly by leveraging Fidor’s API infrastructure. This makes Bitcoin.de the only Bitcoin trading platform with a direct interface to the classic banking system powered by Fidor. Bitcoin transactions soon even could be shown within the Fidor SMART account, but no Bitcoins are stored.”

Figure 3. Stylised depiction of a contractual arrangement between a traditional bank and a Bitcoin-related initiative

Source: Authors’ assessments.

Arrangements of this nature are characteristic of open bank models, whereby the bank retains the basic customer relationship via the current account or other transactions account, but with automatic access granted to external digital product offerings by virtue of an API link to the bank’s infrastructure. At the present stage, however, it is still too early to draw conclusions as to whether open banking or other scenarios will prevail.
Digital providers appear to have several advantages over incumbents, including importantly, their adaptability to individual client needs. Unencumbered by legacy infrastructures and focused on only a few core services, new digital banking initiatives can offer a more tailored, faster, and more cost-effective service. But to whom?

5.2.5 Institutions vs. Functions

As the discussion above indicates, FinTech initiatives are engaged in many of the same activities as commercial banks, including a few that make banks special under the FSN (Table 9). They offer benefits of speed, convenience, and lower costs for most retail payments and transactions services. They also offer safekeeping accounts, but the only way they have found, so far, to match the comfort and safety consumers feel with insured deposits is either to enter into contractual arrangements to acquire coverage indirectly or to convert to a bank charter to acquire coverage directly. Retail customers appear not only to prefer deposit insurance for their savings accounts but also make distinctions among the providers of the guarantees. Either way, the preference consumers demonstrate for safety of their deposits has thus far favoured banking institutions over non-bank providers.

The need to maintain the integrity of the deposit insurance system argues in favour of limiting deposit insurance coverage to institutions that are subject to the appropriate regulation and supervision. That explains why several digital banking initiatives have sought banking licences.

Table 9 shows two major exceptions between the functions that make banks special under the FSN and those performed by digital banking initiatives. They are maturity transformation and serving as conduits for the transmission of monetary policy, as shown by the grey shaded corresponding cells. These exceptions are important.

Table 9. Functions of banks and digital banking initiatives

<table>
<thead>
<tr>
<th>Functions that make banks “special” under the FSN</th>
<th>Functions of digital banks and other FinTech initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safekeeping (deposit taking)</td>
<td>Safekeeping (eW); Deposit taking (DB)</td>
</tr>
<tr>
<td>Offering transactions accounts (redeemable in cash on demand)</td>
<td>Offering transactions accounts (DB, eW)</td>
</tr>
<tr>
<td>Liquidity provision</td>
<td>Liquidity provision (DB, eW)</td>
</tr>
<tr>
<td>Maturity transformation</td>
<td></td>
</tr>
<tr>
<td>Clearing and settling payments</td>
<td>Facilitating the exchange of payments DB, eW, API</td>
</tr>
<tr>
<td>Serving as conduits for transmission of monetary policy</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ assessments.

One might recall from the discussion on banks and the financial safety net that the fundamental reasons why traditional banks as institutions are considered special reflects the specific combination of three functions that they perform, which imply maturity transformation. The three functions are:

1) taking deposits that are withdrawable on demand and at par and on-lending funds;
2) providing liquidity to other banks and non-banks, thus effectively engaging in maturity transformation;
3) serving as conduit for monetary policy transmission.

The literature on why banks are special implies that this mix of functions explains why banks, as institutions, are given access to all financial safety net components (Figure 4) and why the boundaries of the FSN have tended to be focused on institutions rather than functions. In any event, banks have been the only institutions that provide all three relevant functions.

What makes a bank special depends at least in part on legislation, which changes over time and is adapted to changes in the institutional provision of banking-like financial services. But the specialness of banks also depends crucially on decisions of the central banking community to support a system of intermediation based largely on the provision of central bank money to and withdrawal of central bank money from commercial banks. The sight deposits that commercial banks hold with the central bank are particularly important in this context, as they are used for the settlement of payment transactions. Therefore, the importance of banks as conduits of monetary policy should not be minimised when thinking about which types of entities should be covered by the full financial safety net.

Such an argument does not, however, preclude the separable availability of selected safety net components to a broader list of service providers, but these components will likely exclude access to the central bank balance sheet and the lender-of-last-resort function. The exception means that new digital FinTech initiatives can offer some banking services, but those entities unaffiliated with incumbent banks and lacking a banking charter will not have formal access to the lender-of-last resort function. Moreover, as they are currently not sufficiently important systemically or otherwise, they would also not be expected to have access to the (non-explicit) guarantor-of-last-resort function, which was provided during the recent episode of systemic financial distress.
5.3 Conduits for Monetary Policy Transmission

At the peak of the global financial crisis, the perimeter of the FSN was extended, but subsequently a declared policy objective has been to clarify that so-called shadow banking activities are excluded from the perimeter of the FSN.\(^{15}\) According to Adrian and Ashcraft,\(^{2}\) shadow banking consists of financial intermediation that involves credit, maturity and liquidity transformation, thus creating financial stability risks, but without the access to the FSN provisions that banks have.

Banks are special at least to some extent because they have been made “special” by central banks, mainly on account of their role as the main conduits through which monetary policy actions are transmitted to the real economy. In this regard, Huertas notes, however, that some change is taking place. For example, central banks have broadened the perimeter of entities that form part of the monetary policy transmission channel. In particular, via quantitative easing policies and other measures, central banks have broadened the group of counterparties they use beyond banks. Thus, at least along this dimension, banks have become somewhat less special.

Traditionally, central banks mainly used banks to transmit monetary policy impulses to the economy. The policy rate set by central banks has either been the rate at which the central bank lends to banks or the rate at which banks can borrow central bank money in the market. Central banks have conducted monetary policy by either directly lending to banks or by conducting open market operations with them. As a result of these measures, the level of central bank reserves at banks is altered, which in turn affects the banks’ capacity to lend to finance economic activity.

Under quantitative easing policies, central banks interact with securities markets and investors in a more direct way. Central banks determine the eligibility of assets as collateral for lending and repurchase activity and they directly acquire a range of assets via open market operations. In the process, central bank decisions on the range of securities eligible as collateral for central bank open market operations became an additional monetary policy tool, the effects of which go beyond the banking sector. In fact, the choice of the new apparatus of monetary policy tools results, in part, from the view that the relatively weak economic recovery, especially in Europe, even after a decade following the global financial crisis was due to the improper functioning of the traditional monetary policy transmission channel.

Yet another potential challenge for the role of banks as conduits for monetary policy transmission might derive from cryptocurrencies, which could be public or private. The latter are non-convertible into cash, although they might be convertible into other cryptocurrencies or services. As a general rule, they lack any intrinsic value and a recent report by the Bank of International Settlements (BIS) is rather sceptical as to the potential of private crypto currencies to rival legal tender. Yet another scenario would be issuance of public cryptocurrency, which could be legal tender. Thus far, however, the odds of this happening anytime in the near term seem remote.

5.4 Unbundling vs Bundling Retail Banking Services – The Current State of Play

5.4.1 Potential Outcomes of Technological Advances

A lot of attention in the popular press has focused on the challenges the digital transformation poses for incumbents. Researchers have postulated for quite some time that the advance of technology and the related decline in

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\(^{15}\) The most recent discussions of the Financial Stability Board (FSB) suggest to use the term “non-bank financial intermediation” instead shadow banking, but for simplicity and conformity with common references, the present discussion continues to refer to shadow banking activities.
information asymmetries would lead to an unbundling of the value chain for banking services. This hypothesis has been explored recently in the Basel Committee on Banking Supervision’s investigation of the implications of Fin-tech developments for the banking sector [3].

Five potential scenario outcomes were put forward (Figure 5), ranging from the survival of incumbent institutions in the guise of the “better bank”, achieved through the successful digital transformation of established players, to the fully “disintermediated bank”, which has been replaced by peer-to-peer systems. Intermediate outcomes include, toward the negative side for incumbents, the “relegated bank”, which continues to exist and supply products, but for which the customer relationship has been ceded to new players. This outcome contrasts with the “open bank” scenario, whereby the bank retains the customer relationship, but in an open architecture characterized by the pass-through of products from third-party providers and partners. A fifth scenario reflects the entry of new players.

**Figure 5.** Understanding the challenges of the digital revolution -- five scenarios

![Figure 5: Understanding the challenges of the digital revolution -- five scenarios](image)

*Source: Basel Committee on Banking Supervision [3].*

### 5.4.2 Scale and Scope Without Mass

Finance has been digitalising for some decades now and while the pace of change has certainly quickened of late the impact has thus far been less pronounced than in some other sectors of the economy, such as media and retail shopping venues. It seems highly unlikely that finance will avoid some upheaval, given that the digital transformation is pervading all sectors of the economy and encompasses all customer types (i.e. individuals, professionals, small enterprises, corporate businesses, and investors). It is thus not surprising that surveys of senior bank officials suggest that bank managers take the competitive threat coming from the ongoing digital transformation of banking seriously. Abstracting from the hype that often accompanies periods of rapid innovation, there are several practical reasons why.

The conversion of information from analogue to digital forms, along with the development of application systems and platforms, is changing the nature of assets that generate value, how ownership is imparted and where value is generated. This development fosters changes in the structure and operation of markets, allows mini-economies or ecosystems to be formed and, built on the connectivity of the Internet, ultimately encourages changes in the nature of relationships, both social and economic. In particular, the ability to code and store information in standardised form lowers a broad range of transactions costs and provides a common framework for interaction and the development of customised relationships. There are direct parallels to banking.

Recall from the discussion above that the defining characteristic of the retail financial services segment has been the importance of the long-term relationship between the bank and the retail customer/client. The historically face-to-face nature of the relationship helped to explain the effort and investment incumbent banks devoted to developing or acquiring direct distribution channels. The problem with retail distribution infrastructure such as the branch-based network of commercial banks is that they tend to be very costly to establish and maintain. To make them cost-effective requires distributing a high enough volume or value of products and services through them to cover all costs, including the staff and branch costs of mobilising and administering the products.

The benefits are that branch networks can support many different product lines. The retail financial services segment encompasses transactions services (e.g. payments), lending, savings and safekeeping, investments, insurance, and financial advice. Commercial banks have traditionally offered a bundle of these products and services.

Scope economies could exist in these arrangements if, for example, consumers perceived the all-in costs of purchasing multiple products from a single supplier to be less than the costs of purchasing them from multiple sellers. Lower search costs could be a factor in this regard. There could be a positive reputation effect as well if customers associate additional products and services from a known provider with a certain measure of quality. For the bank, the ability to cross-sell new products to a given customer over time is a core aspect of the profitability of the relationship.

The digital transformation of finance introduces new dimensions to the concepts of scale and scope. In contrast to physical products and distribution channels, which can entail high fixed costs and significant marginal costs that
decline with scale, digital financial products may have high initial fixed costs associated with software and application development, but little if any marginal costs. This feature, combined with global distribution potential via the Internet, can enable digital providers and platforms to achieve scale without mass; that is, with very few employees or tangible assets, the same as for other sectors that have undergone the digital transformation.

The potential for scope economies also exists in the digital environment. Just as high switching costs can cause retail customers of traditional banks to become locked-in with their existing service provider, digital applications and data can be managed to reduce the cognitive costs to users, which can help to attract, engage, and maintain relationships over time. These practices also produce “lock in” effects to the extent users become accustomed to the look and feel of particular applications and the portability across them. The applications can then be used to provide additional products and services, once the necessary conform level has been reached.

For banks, products and services on the asset side need to be priced to cover all operating costs, including staff and branch costs, costs of loan-loss provisions, and the cost of capital. Under normal circumstances, the total revenues from the cluster of financial products offered by banks exceed total costs and banks are profitable on a portfolio-wide basis. But on a component basis, the results can be quite different. Importantly, revenues from products and services for which the bank has some pricing power may be used to subsidise those from more competitive market segments where margins are lower. A prime example comes from credit card users. Customers who maintain outstanding account balances over multiple billing cycles are charged high fees and constitute a major source of profits for providers. Payments have been called the proverbial “cash cow” for banks, which no doubt explains why this source of revenues is the primary target of digital alternatives, in several cases with the explicit support of policymakers.

In addition to the open banking initiatives noted above are other measures directed at the cost of retail payments. They include measures in jurisdictions such as Australia, Canada and Europe that aim to limit the fees charged on transactions. EU interchange fee regulation is designed explicitly to cap interchange fees and weaken so-called “honour all cards” rules, which prevent merchants from refusing any cards bearing the same logo as other cards they already accept. The rule changes seek to enable merchants to refuse high-fee cards.

The lower operating costs of digital initiatives and innovative use of digital technologies allow for new business models and revenue propositions. Some arrangements are a straightforward pass-through of lower costs. For example, in the payment card area, new digital-based lenders target the most profitable customers of traditional card providers, those who carry balances forward, but offer them much lower interest rates. The payments area also features low-fee and even no-fee business models.

### 5.4.3 New Digital Banking Initiatives

Apart from more favourable pricing, many digital financial initiatives seek to provide greater customisation of the products and services they offer. For some types of financial products and services, customers have similar demands, which allow for standardisation of products and widespread distribution. Where that is the case, providers have sought to build or acquire economies of scale in production or in distribution. Money market mutual funds and similar types of pro rata asset management products are one example. Armed with new digital technologies and applications, new banking initiatives have moved in the opposite direction, toward greater customisation but with simpler propositions (Table 10).

<table>
<thead>
<tr>
<th>Type of entity</th>
<th>Product offerings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital banks</td>
<td>Deposits, savings, payments, foreign exchange</td>
</tr>
<tr>
<td>Digital wallets</td>
<td>Retail payments, transactions accounts</td>
</tr>
<tr>
<td>Marketplace lenders</td>
<td>Lending</td>
</tr>
<tr>
<td>APIs</td>
<td>Payments, foreign exchange, cash management, trade finance</td>
</tr>
</tbody>
</table>

Source: Authors’ assessments.

Many new digital banking initiatives appear to have ample start-up and venture capital funding and seem to be engaged in a quest to win market share. The digital transformation of other sectors has featured this core strategy, whereby ample digital capacity and the perceived advantages of scale encourage and justify bearing short-term losses while scaling up to gain market share and future profitability. Customers clearly benefit in the expansion phase from greater convenience and choice, and low prices. For some digital banking initiatives, especially in the payments area, low pricing takes the form of the “no fee” model. Customers become conditioned to expect low prices as more start-ups enter and adopt the new pricing model, which forces incumbents to follow suit.\(^\text{16}\)

In the case of lending platforms, many are still making losses, as they have not yet achieved a sufficient scale to cover their fixed costs. Achieving scale is thus a key aim for many platforms. For some, scale seems to require the

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\(^{16}\) See, for example, Beaudemoulin et al. [4].
involvement of institutional investors. For example, one solution has been to arrange partnerships whereby institutional investors automatically finance the project if retail funding is insufficient. Concerns have been expressed that, given the interest in institutional investor investments, the latter might be given preferential or exclusive access to certain loans or information or the option to opt out from certain segments of the market.

In the longer term, a no-fee model for an entity offering a limited product range is a questionable revenue proposition, which means new initiatives must eventually develop and deploy priced services, adopt a different revenue model, or be absorbed into the ecosystem of a multi-product entity. Consolidation has been a common outcome in markets subject to excess capacity and some new digital banking initiatives have been acquired by incumbent providers or by other entities seeking to expand their scale or make their own inroads. Other initiatives attempt to remain independent by relying on new revenue streams, obtained for example from exploiting their data or earning commissions on customer referrals. The long-term success of these approaches is not yet clear.

It is likely that increasing competition, induced by the entry of digital alternatives into the payments ecosystem, will put downward pressure on margins from payments services. This outcome is one of the main intended consequences of new regulatory initiatives. The pressure on margins will apply to all intermediaries that provide such services. What it implies for profitability depends on the structure of costs for individual service providers and the role payments services play in their overall business model.

Under increasing pressure from competitors, banks do expect to see a continued reduction in fees – and even an expansion of the no-cost model – on payment means (cash, bank cards, checks, transfers and direct debits), brokerage services for unit-linked contracts or collective investment scheme units, and more generally, on everyday banking services where customers feel autonomous. There are many client segments in retail banking, not all of which are especially price sensitive. Most savers who select a liquid account are more interested in greater access to their savings and the safety of their funds than in higher interest earnings.

Hence, while some financial products may, at a basic level, be recognised as the same sort of product – that is, a retail deposit account is a retail deposit account – they are not generally speaking treated as perfect substitutes by the typical retail customer. There must also be appropriate levels of customer protection, privacy and above all security, and for some products, these concerns appear to dominate price considerations. These considerations may limit the ability of some stand-alone digital banking initiatives to reach critical size. The entry of other already trusted entities into the field, such as large online platforms or tech firms, could be a different story, however.

6. Preliminary Conclusions

Banks’ performance of core economic functions is challenged to some extent by new and developing digital banking initiatives. The degree to which the latter pose a serious competitive threat differs from one specific function to another, and banks are increasingly part of these developments. In any case, the specific combination of different financial functions performed by banks remains unique and, thus, these entities continue to be at the core of the financial safety net.

Such an argument does not, however, preclude the separable availability of selected safety net components, such as deposit insurance, to a broader list of service providers. But this would come with the likely exclusion of access to the central bank balance sheet and the lender-of-last-resort function. Thus, while new digital Fintech initiatives can offer some banking services, those entities unaffiliated with incumbent banks and lacking a banking charter will not have formal access to the lender-of-last-resort function and, as they are currently not sufficiently important systemically or otherwise, they would also not be expected to have access to the (non-explicit) guarantor-of-last-resort function, which was provided during the recent episode of systemic financial distress.

Digital banking initiatives serve as a reminder of the limits of an entity-based approach to regulation. The need for regulatory and supervisory approaches to Fintech to be in principle more activities-based rather than entity-based has been acknowledged for some time now, but in practice, the entry point for regulators and supervisors remains an entity. The unbundling and re-bundling of financial services implies that financial services are partly provided by incumbent banks and partly by new and more lightly (or un-) regulated digital initiatives.

Some safety net provisions are made available to (lightly) regulated Fintech initiatives, although it is not always clear whether they pay an adequate price in exchange. In particular, while newly formed digital banks benefit from and pay a price for deposit insurance, they also undertake activities that are certainly beyond the current perimeter of the financial safety net, such as providing e-wallets to hold, exchange and transfer private cryptocurrencies.

The outcome of the current wave of innovation will be
shaped by the regulatory response. There exists no widely agreed preferred approach in this regard, however. Both the environments for digital financial innovation and existing financial regulatory frameworks differ across countries.

References


ARTICLE
Do Pension Funds Foster Economic Growth Better Than Mutual Funds?
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ABSTRACT
Tensional arguments about pension funds and mutual funds towards economic development and stimulation seem to be inevitable among policymakers and economic agents with little paid attention as in literature. This study however took a comparative significance analysis of these two independent funds in relation to economic growth in the South African economy. We hypothesize that, mutual funds are more powerful than pension funds in fostering economic growth as evidenced by some scenarios where mutual funds are trusted to encounter pension funds risks. We then used multiple linear regression model accompanied by a t-test means difference test as a measure of significance difference between the two towards economic growth. As a primer approach, we used the Pearson correlation analysis and the results were noted. Pension funds are a powerful tool of fighting poverty in economies. However, our results were not in support. Our results tend to agree with our suspicion. From all the methods used, mutual funds proved to have greater impact on stimulating economic growth (GDP) in South Africa. Therefore, South African policymakers and officials should by all ways try to support the mutual fund industry as it have traceable marks on economic growth stimulation but pension funds should not be totally ignored as they play significant roles as well such as poverty fighting and ensuring survivability of the most stressing dependent group in the economy.

1. Introduction
Economic growth measurement and evaluation using economic development elements is surely an unfailing practise by almost every existing nation across the globe. Elements such as poverty rates, literacy rates and standards of living are the common factors used to evaluate economic development progress of any country. On the other hand, economic growth is a serious matter of concern which is receiving a better attention and in popular, Gross Domestic Product (GDP) is used to measure economic growth with time. Poverty is a serious matter that should be paid enough attention as it explains well the standards of living of any nation. Of interest, poverty rates tend to hit economies normally in clusters and these existing groups should be treated and catered for differently by economic advisors and policymakers. This makes it interesting to analyse economic growth for nations like South Africa. In common practise, economic growth is driven and fuelled by a number of factors such as for-
eign direct investment (FDI), high aggregate demand and supply, low interest rates, free international trade to mention a few. Financial development including financial markets and economic growth is becoming a special area of focus in any economy. This when integrated with investment by individuals in assets and fund portfolios makes it a powerful and an inquisitive area of focus for both developing and developed countries. In particular, fund industries are very important economic sections which can leave remarkable traits to economies if well treated and well valued. This is because such funds help much in boosting economies through supporting private business prospects in risk management and output gaining, ensuring a constant investment return balance for members and the economy at large. Despite the little attention paid to the fund industry and economic growth nexuses, we aim to put on surface and to validate such a powerful subject. Our core belief and mere understanding is that, the fund industries ignite economic growth. In this study, we shall only consider two unrelated fund systems: mutual funds and pension funds. Our study aims to see whether these funds propel economic growth in South Africa or not and if so by how much. More importantly, we aim to carry out a comparative analysis for the two funds against economic growth. Our central question is that, are mutual funds more capable enough to drive economic growth faster than pension funds and we aim to answer that question using a comparative analysis approach. We hardly found exact related work to our subject but not absolutely. More related literature seems to exist in the field. Tan [12] contributed an empirical discussion on the mutual performance in general in South Africa. He aimed to evaluate the performance of South African equity funds between January 2009 and November 2014. Among his results, he found that The JSE has the highest standard deviation and the Huysamer Equity Fund, the Old Mutual Fund Investors Fund A and the Coronation Equity Fund follows the JSE, in that order. Also, anon (2010) from a research bulletin provided an insight on whether there is a link between equity returns and GDP. They considered an international data from 1969 to 2009. Also, they noted that supply-side models tie a country’s stock returns to its GDP growth, but they do not suggest a perfect match between the two variables. On the other hand, Davis and Hu [5], examined whether there is a link between economic growth and pension funds schemes at cross-country level. They designed a modified Cobb-Douglas production function with pension assets as a shift factor, and investigate the direct link between pension assets and economic growth employing a dataset covering up to 38 countries, using a variety of appropriate econometric methods. They found positive results for both OECD countries and Emerging Market Economies (EMEs), with consistent evidence for a larger effect for EMEs than OECD countries. Additionally, Ozturk [10] provided evidence on the effect of the operation of the funded pension scheme since its inception in 2004 on economic growth in Nigeria using error correction mechanism (ECM) and Ordinary Least Square (OLS) methodologies. His results suggested that the pension fund contributions from both private and public sectors in Nigeria increased greatly and constituted a huge investment fund in the capital and money markets. He then concluded that, with good risk and portfolio management by pension fund administrators and custodians, the contributory pension has the capacity to boost the Gross Domestic Product (GDP) in Nigeria and very convenient to retirees compared to the previous defined benefit scheme. Further, Yilmaz and Ozturk [13] investigated the growing value of the assets by pension funds on the economic growth in 26 OECD (Organisation for Economic Co-operation and Development) countries during the 2001-2015 period employing Dumitrescu and Hurlin [3] causality test. The findings revealed a bilateral causality between pension funds and economic growth. These results were all very much interesting in relation to our study. Other scholars such as Bijlsma et al. [1] and Farayibi [5] looked at the impact of pension funds on economic growth using 34 OECD countries and Nigeria respectively. As a top up, Davis and Hu [2] researched the impact of pension funds on the economic growth in 38 countries from OECD and emerging markets using various techniques of panel data analysis and concluded that pension funds affected the economic growth positively. While Edogbaya [4] used correlation t-test analysis on the impact of pension funds on economic growth with the results stating that Contributory Pension Scheme (CPS) has significant impact on the GDP, Schmidt-Hebeel [11] reached the conclusion that pension reform in Chile boosted private investment, the average productivity of capital and TFP, which suggest an increased economic growth from pension funds. Other related work includes work by Hurlin and Venet [9] and Hurlin (2005), Hu [7], Gunu and Tsado [6] who proved to agree that, though not in South Africa, there exists a positive relationship between economic growth and pension funds. Of course great significant related work was done but we could hardly find an exact match to our contribution which explicitly explains its novelty. Also, related work on mutual funds and...
economic growth appeared in small volumes and it is also going to be our contribution. Therefore, in this paper we are going to explore the growth nexus between economic growth, pension funds and mutual funds in the South African state. We aim to use a comparison analysis in order to evaluate the two funds before coming to our conclusions. Our suspicion is that mutual funds can foster economic growth in South Africa at a faster rate than their pension funds counter parts. Our model shall be accompanied by a number of statistical tests using the collected data and relevant inferences shall be drawn before reaching out our conclusions and recommendations.

2. Overview of Mutual Funds and Pension Funds

We shall give out a brief explanation and explicit meaning of each fund before getting into our core study.

2.1 Mutual Funds

In financial terms, a mutual fund is a typed one which offers small investors diversification opportunities; therefore, it is a pool of funds for small investors where benefits of diversification are realised at a relatively low cost \[8\]. They are more regulated than other funds such as hedge funds which make them unique and safe to opt for. They share the same regulation feature with the pension funds counterparts. Mutual funds are popularly known for their feature of improving the investor’s risk-return trade off. Mutual funds normally appear in long-term funds such as bond funds that invest in fixed income securities with a life of more than a year, equity funds that invest in common and preferred stock and hybrid funds that invest in stocks, bonds and other securities. But, the most common mutual fund is the open-end fund. Open-end fund implies that the total number of outstanding shares goes up as investors buy more and down as more are redeemed. Interestingly, mutual funds are valued each day at 4.pm. This is done through calculation of market values of each asset in the portfolio so as to find the total fund value. This fund value is of noble use in broad analytics such as ours. Normally, mutual funds do well but they do not beat the market. Mutual funds do advertise frequent impressive returns. From this idea we are convinced that mutual funds can propel economic growth. We hypothesize that, like micro-finances, mutual funds can empower small to medium investors and businesses and thus in turn increase aggregate demand and supply of an economy. We therefore below present a graphical illustration of the ratio data for mutual funds to GDP in South Africa to have a general outlook.

2.2 Pension Funds

Pension funds are a pool of contributions either by both employee and employer or by employers only during the employee working life. From other words of practitioners, a pension fund is an investment product into which scheme members pay contributions in order to build up a lump sum to provide an income in retirement. Of interest, the contributions are made using either of the two distinct plans: defined benefit and defined contribution plans. Defined benefit plan is based on the philosophy that, on retirement the employee gets what is defined by his/her employer and for defined contribution, the employee gets the resulting investment output from the invested employee and employer contributions. However, the later is now the widely and commonly used plan. In this paper, we shall consider both types. These underlying pension funds are run by insurance companies and a small section of asset managers. Pension funds are development in target of the late aged people who normally leave work at retirement. They are designed to sustain the lives of retirees after their work life and other minor groups who may have exited their work through other modes. In most cases, the pooled funds are converted to a life annuity or are invested in a number of financial assets such as equities, government bonds, prescribed assets, non-vested assets among other valuable and profitable investments. The main topping reason behind developing all such investments is to curb

Figure 1. Mutual funds to GDP growth ratio in South Africa

Source: Author’s own compilation using data from World Bank.

The above trend is a complete show off of mutual funds to GDP ratio in South Africa. The trend shows an ever increasing ratio of the two. This means that, as mutual funds adjusted alphas increase so it does to the GDP. This well defines the origins of our claim in this study. However, the establishment of our claim shall be met in the statistics proceedings below.
the main tremendous challenges of insolvency and fund default. However, despite all this value of pension funds, we aim to see their value to economic growth in South Africa. We claim that, retirement funds do wipe off poverty levels and it boost economic growth and development in terms of health, improved standards of living and improved life expectancy. We therefore provided a trending insight for the pension funds in the South African economy using the pension funds returns to GDP ratio as below.

**Figure 2.** Pension funds to GDP growth ratio in South Africa

*Source:* Author’s own compilation using data from World Bank.

This trend is typically different from the one for the mutual funds. There were cyclical patterns on the ratio from 2000 to 2009. This means that, during the period there was fluctuations in the pension funds and consequently economic growth. However, from 2009 to 2016 the ratio sharply increased. This creates another claim that we interestingly want to examine as well. Everything is going to be answered as we go down the discussion.

### 3. Data and Methodology

Our aim is to verify whether mutual funds and pension funds do foster economic growth and if so, by how much. Our study aims to weigh the two fund systems against GDP. We aim to see and to verify that, which of the two funds foster economic growth at a faster rate than the other. Therefore, we shall use a statistical comparison based approach. The methodology therefore flows as follows.

#### 3.1 Data

Our study period spanned from 2000 to 2018. We used World Bank data for pension fund asset returns, mutual fund asset returns and Gross domestic product (GDP) as a measure of economic growth. The collected data in its sufficiency was used to make inferences towards our study questions and objectives. We were fortunate to have no missing values for the whole targeted sampling period.

#### 3.2 Hypothesis

For the purpose of testing whether pension funds and mutual funds have effect on economic growth or not, we uniquely formulated our hypotheses as follows:

- **H₀:** Mutual funds do equally foster economic growth as pension funds for South Africa.
- **H₁:** Mutual funds foster economic growth more than pension funds for South Africa.

So, we shall perform a balanced one tailed test of hypothesis as stated above.

### 4. Results and Findings

The results for the sensitivity of economic growth to mutual funds and pension funds were presented and the derived model is as:

\[
EGRATE = \beta_0 + \beta_1 \text{MUT FUND} + \beta_2 \text{PENS FUND} + \epsilon_i
\]

where,

- \(EGRATE\) is the economic growth rate for South Africa.
- \(\beta_0\) is the intercept on dependent variable which takes a constant variable.
- \(\beta_1\) and \(\beta_2\) are slopes of mutual funds and pension funds respectively.
- \(\text{MUT FUND}\) is the short for mutual funds.
- \(\text{PENS FUND}\) is the short for pension funds.
- \(\epsilon_i\) is the stochastic variable which captures other important but not included factor variables.

All our parameters are to be estimated using Least squares estimation (LSE) method and the resulting model analysis are presented below. To test our claim we used means difference test based on the p-value approach. Summary results and tables are well presented in the appendix section. In addition, we shall perform the Pearson’s correlation test based on the correlation coefficient hypothesis. We did use this only to ascertain if there is a link between our variables of interest before fitting our model. Lastly, other important test such as the normality Shapiro- Wilk test were blindly done as one of the key pre-modelling requirements. The data used was normal which enhanced us to carry out well our statistics like the Pearson correlation and regression analysis.

**Table 1.** Correlation summary table

<table>
<thead>
<tr>
<th></th>
<th>GDP</th>
<th>Pension Funds</th>
<th>Mutual Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pension Funds</td>
<td>-0.5717</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mutual Funds</td>
<td>0.1367</td>
<td>0.1003</td>
<td>1</td>
</tr>
</tbody>
</table>
The table above shows the relationship between Gross Domestic Product (GDP), pension Funds and Mutual funds. Results suggested a positive correlation between GDP and Mutual Funds. A correlation coefficient of 0.1367 was obtained. This means that, as mutual fund asset returns increases, so it does to economic growth. This leaves an implication that, the South African government can safely support and boost its mutual fund section in the fund industry as they highly compliment an increasing economic growth. On the contrary, there was a negative correlation of -0.5717 between Pension funds and economic growth. This means that, an increase in pension asset returns forces the economic growth to decrease. This means that mutual funds have a greater capacity of pulling up the economic growth of South Africa if well welcomed and well treated. However, a negative correlation on Pension Funds and GDP is a complete signal to the government to make an extra effort to boost its Pension fund section in order to increase its GDP records.

Table 2. Regression summary

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F(1, 16)</th>
<th>4.59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>23.6830433</td>
<td>2</td>
<td>11.8415217</td>
<td>Prob &gt; F</td>
<td>0.0265</td>
</tr>
<tr>
<td>Residual</td>
<td>41.2334475</td>
<td>16</td>
<td>2.5770047</td>
<td>R-squared</td>
<td>0.348</td>
</tr>
<tr>
<td>Total</td>
<td>64.9164808</td>
<td>18</td>
<td>3.6067171</td>
<td>Root MSE</td>
<td>1.6053</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>Coef.</th>
<th>Std. Err.</th>
<th>t</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension_fund_returns</td>
<td>-1.122583</td>
<td>0.361982</td>
<td>-3.15</td>
<td>(-2.16, -0.09)</td>
</tr>
<tr>
<td>Mutual_fund_returns</td>
<td>-0.3590631</td>
<td>0.0366704</td>
<td>-9.85</td>
<td>(-0.42, -0.29)</td>
</tr>
<tr>
<td>_cons</td>
<td>3.357013</td>
<td>0.853456</td>
<td>3.97</td>
<td>(0.94, 4.96)</td>
</tr>
</tbody>
</table>

Note: Our regression analysis was done using SPSS. We considered its use because it is good at tabulation of the results and it provides a quick and clear way of analysing results.

From the table above, we performed a regression analysis to explore the cause and effect between GDP and the covariates; pension funds and mutual funds. As we aimed to explore the effect of mutual funds and pension funds on economic growth in South Africa, our regression analysis brought out some interesting results. We found a negative and positive relationship between GDP and pension funds and mutual funds respectively. These results tended to move in the same direction with the correlation analysis results. The derived and fitted model is as:

\[ GDP = 0.33517 + 0.35906\text{MUT f} - 1.12528\text{PEN f} \]

The fitted model can be used for forecasting future economic growth in terms of gross domestic product (GDP). However, from the coefficient of determination obtained, all the funds failed to fully explain the variances in the GDP. This means that the changes in economic growth can be well explained and captured by other factors than mutual and pension funds, although they are of value.

Table 3. Hypothesis testing results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>Std. Dev.</th>
<th>(95% Conf. Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension_fund_returns</td>
<td>19</td>
<td>2.0908056</td>
<td>0.2801932</td>
<td>0.9782402</td>
<td>(1.6248, 2.5558)</td>
</tr>
<tr>
<td>Mutual_fund_returns</td>
<td>19</td>
<td>13.259561</td>
<td>0.3070118</td>
<td>1.026989</td>
<td>(12.7263, 13.7926)</td>
</tr>
<tr>
<td>combined</td>
<td>38</td>
<td>7.650784</td>
<td>0.108235</td>
<td>0.570862</td>
<td>(7.27872, 8.02069)</td>
</tr>
</tbody>
</table>

Note: Our regression analysis was done using SPSS. We considered its use because it is good at tabulation of the results and it provides a quick and clear way of analysing results.

To fully compare and to establish the actual strength of either mutual funds or pension funds on driving economic growth, we performed a means difference test. We conjectured that, the two funds perform differently as they operate in different ways. As such, their contribution to economic development also differs. In clearer terms, our claim was that, mutual funds perform and drive economic growth better than pension funds. Based on the stated hypothesis and the means difference test done, we rejected the null hypothesis. This is so because the p value (0.0000) was less than the level of significance (0.05) this means that, there is statistical evidence that, mutual funds do foster economic growth more than pension funds. Thus, mutual funds proved to be stronger than pension funds when it comes to deriving economic growth in South Africa.

4.1 Stationarity Test

As we shall conduct the Granger causality test and the vector autoregressive modelling, we shall first establish and test whether or not our data is stationary. To meet this, an Augmented Dickey Fuller (ADF) unit root test shall be done. The test is done based on the following hypothesis;

\[ H_0: \text{There stationarity (there is unit root).} \]
\[ H_1: \text{There is no stationarity (no unit root).} \]

The results of the test are presented below;
We performed the ADF test for all our variables. From the table above, we found enough statistical evidence on stationarity of our data. We failed to reject the null hypothesis since the p values for all the variables were less than the significance level of 5%. This was in line with the fact that, the calculated values were all positive and greater than the tabulated critical values. Therefore, the data used is stationary.

The table shows the results from the VAR models among our variables. We intended to check whether the variables drive each other. We constructed our VAR models at lag 2. L1 and L2 are lags 1 and 2 respectively. Our claim is that, the independent variables: pension funds and mutual funds drive economic growth (GDP) as below:

\[ H_0: \text{Lagged mutual and pension funds does not drive economic growth} \]

\[ H_1: \text{Lagged mutual and pension funds drive economic growth} \]

We shall test the claim using the granger Wald test presented below.

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Table 4. ADF test results

<table>
<thead>
<tr>
<th>Test</th>
<th>1% Critical</th>
<th>5% Critical</th>
<th>10% Critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z(t)</td>
<td>-2.61</td>
<td>-1.95</td>
<td>-1.62</td>
</tr>
</tbody>
</table>

MacKinnon approximate p-value for Z(t) = 0.12

We performed the ADF test for all our variables. From the table above, we found enough statistical evidence on stationarity of our data. We failed to reject the null hypothesis since the p values for all the variables were less than the significance level of 5%. This was in line with the fact that, the calculated values were all positive and greater than the tabulated (critical values). Therefore, the data used is stationary.

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\[ H_1: \text{Lagged mutual and pension funds drive economic growth} \]

We shall test the claim using the granger Wald test presented below.

Table 5. Vector autoregressive (VAR) models

| Equation | Coef. | Std. Err. | z    | P>|z| |
|----------|-------|-----------|-----|-----|
| GDP | 1.1956 | 2 | 0.550 |
| | 0.3877 | 2 | 0.824 |
| | 8.5403 | 2 | 0.014 |
| Mutual_fund_returns | 1.1956 | 2 | 0.550 |
| | 0.3877 | 2 | 0.824 |
| | 8.5403 | 2 | 0.014 |

In this study, we are mainly concerned with the causalities between GDP and pension funds and mutual funds. From table of test done above, there is enough statistical evidence that, mutual funds does not cause GDP to rise. This is because the p value is greater than 5%. On contrary, pension funds do drive GDP since the p value is less than 0.05. However; the joint impact of pension funds and mutual funds on economic growth seems to be controversial. There joint impact of the two funds is not strong enough to drive economic growth. This gives an insight to the policy.

Table 6. Granger causality test

<table>
<thead>
<tr>
<th>Equation</th>
<th>chi2</th>
<th>df Prob &gt; chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP Mutual_fund_returns</td>
<td>1.1956</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>0.3877</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>8.5403</td>
<td>2</td>
</tr>
<tr>
<td>Mutual_fund_returns</td>
<td>1.1956</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>0.3877</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>8.5403</td>
<td>2</td>
</tr>
</tbody>
</table>

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makers and officials about the effort required to boost the funds industry in South Africa. But generally, the funds are important in the economy.

4.2 Residual Analysis

4.2.1 Normality / Homoscedasticity Test

The above plot is a normal plot for the residuals obtained from our data. The results are evidently showing that the errors are normally distributed. This agrees with the true theoretical definition of errors which states that errors should be normally distributed with mean zero and constant variance. Results from our QQ plot indicates the presence of the normality of the error terms as the fitted line is close to a straight line.

4.2.2 Independency Test

We shall finally explore this assumption test by constructing the partial autocorrelation function. We shall use the time series approach. The idea is based on the number of spikes from the acf constructed. The graph is shown below.

From the correlogram the autocorrelation function and constructed above, the residuals are not correlated with the observed GDP values. The autocorrelation function was constructed with the support basis of the Yulle walker (yw) equations. The yw helped to produce the acf figures on the table above. The results showed that, high autocorrelation (ac) values correspond to overlapping spikes and true otherwise. The variance lies within the confidence intervals and there are no significant and overlapping spikes. This means that, the residuals are independent of the fitted values, thus the assumption holds.

Thus, since the assumptions hold, it follows that all our prior analytics done were statistically sounding and meaningful. This means that, the inter-link between the funds and the insurance industry is significant and it should be an area of interest to policy makers and government officials.

5. Discussions and policy recommendations

Based on the results obtained, mutual funds proved to be more significant in stimulating economic growth than pension funds. A positive and negative correlation between GDP, mutual funds and pension funds respectively explained the differences in the strength of the funds in driving economic growth in South Africa. This means that if mutual funds perform well and earn high significant returns from the invested assets, further investments will be opened which bears more implications on macro-economic variables such as unemployment reductions. Such drifts do foster economic growth in the long run, provided the economy remains functional and stable. It should however, not disregarded that, pension funds plays also important roles in boosting economic growth. Such funds need only enough and substantial support from the laws, regulations and government policies. If well treated and governed, pension funds have the capacity of boosting the economic status of South Africa. Having conjectured

Table 4. autocorrelation analysis table

<table>
<thead>
<tr>
<th>LAG</th>
<th>AC</th>
<th>PAC</th>
<th>Q</th>
<th>Prob&gt;Q [Autocorrelation]</th>
<th>[Partial Autocor]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.4649</td>
<td>0.3469</td>
<td>6.7904</td>
<td>0.0286</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.2232</td>
<td>0.0091</td>
<td>5.96</td>
<td>0.0508</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.0967</td>
<td>-0.0132</td>
<td>6.1931</td>
<td>0.1026</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.0294</td>
<td>-0.0158</td>
<td>6.2161</td>
<td>0.1836</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.1406</td>
<td>0.1383</td>
<td>6.8739</td>
<td>0.3327</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.0424</td>
<td>0.0460</td>
<td>6.2672</td>
<td>0.2601</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.0612</td>
<td>-0.0378</td>
<td>6.9883</td>
<td>0.4297</td>
<td></td>
</tr>
</tbody>
</table>
that, the two funds perform differently, with the mutual funds being above pension funds, our results supported our claim and concluded that mutual funds perform and drive economic growth better than pension funds. This was based on South African data. On the other hand, from the granger causality test done, pension funds drive GDP while mutual funds does not. The joint impact of the two funds showed that, if well managed and promoted they can boost economic growth. The derived p value is 8% which is relatively close to 5%. We therefore, recommended that, South African government should take a solid position to support the fund industry so as to ensure visible and significant returns. An improved fund performance bears more positive implications on economic growth and as such, they should be supported. This paper lastly suggested that, other wider studies can be further done on the same subject where a consideration of either cross-country, panel or cross sectional data is made.

References

Impact of Controlling Shareholder Equity Pledge on Corporate Value

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Incentive effect; Encroachment effect

ABSTRACT

As an innovative financing behavior, equity pledge breaks the limit of traditional financing, and broadens the financing channels of companies and major shareholders. This paper comprehensively considers the impact of controlling shareholder equity pledge on corporate value from three research perspectives. The main conclusions are as follows: (1) When the equity pledge is not considered, the cash flow rights and voting rights of the company owned by the controlling shareholder are positively correlated with corporate value. That is, this presents incentive effect, but the existence of the separation of the two powers brings the second type of agency problem and reduces corporate value. (2) When considering the equity pledge, the controlling shareholder’s equity pledge may weaken the incentive effect and strengthen the encroachment effect which causing a reduction of corporate value. (3) Based on the accounting point of view, the controlling shareholder’s equity pledge is negatively correlated with the corporate performance, while the concentration of ownership dilutes this negative effect. (4) The balance of equity weakens the negative effect of the controlling shareholder’s equity pledge on corporate value, thereby reduces the negative impact of the equity pledge.

1. Introduction

1.1 Research Background

Due to the economic downturn in recent years, the real economy development of China has hit a bottleneck. Many listed companies have been caught in the tight capital chain, and a growing number of listed company shareholders have pledged their equity to finance the company. According to the Wind Database, controlling shareholders of 3019 listed companies in the A-share market raised capital through the pledge of shares, which presents a grandeur of “full-stock pledge” by the last trading day of 2018.

The equity pledge converts the funds invested by shareholders into the company from static to dynamic. Put another way, the funds enter the secondary market circulation once again, and the liquidity is greatly enhanced. The characteristic of equity pledge is that it not only provides loans for the controlling shareholder, but also maintains his control over the company. However, the actual cash
flow rights are reduced and the degree of separation of the two powers is intensified, while the controlling shareholder’s control over the company remains unchanged after the pledge. As a result, the controlling shareholder’s cost of encroaching on the corporate interests is reduced, and the possibility of expanding his own income by sacrificing the minority shareholders has increased significantly.

Since the concentration of shares is a common phenomenon in listed companies, many controlling shareholders have very strong control and take a special position in the listed company. The pledge of the controlling shareholders is also easily transmitted to the listed companies through various paths, which has a greater impact on corporate value. This indicates that although the equity pledge brings more benefits to the market, it also brings greater risks.

1.2 Research Objective

In previous literatures, we found that researches on equity pledge are mostly focused on case analysis, which makes the conclusions not comprehensive enough to be applied to most listed companies. They are highly targeted, but inadequately universal. In addition, empirical studies on equity pledge are lack of the updated data analysis for the fast changing market. Different from the existing researches, this paper will analyze the impact of the controlling shareholder’s equity pledge behavior on corporate value from the perspectives of separation of powers, company performance and balance of shares, based on the China’s A-share listed companies’ equity pledge in 2014-2017.

The findings of this research are practical for investors. First of all, in recent years, equity pledges have grown rapidly, which has had a great impact on the market and investors. Therefore, based on information asymmetry theory, principal-agent theory, etc., this paper combines the status quo of equity pledge to conduct empirical analysis, and helps investors to better understand the financing methods.

Secondly, although the development of equity pledge is fast, the development of relevant laws and systems has not kept pace with the equity pledge, which has brought certain challenges to the regulatory authorities. This paper proposes corresponding suggestions about governance through empirical analysis, and then promotes the regulation of equity pledge.

The current academic researches on equity pledge mainly focus on two aspects: First, the analysis of the economic consequences of equity pledge, including the impact on the corporate stock price, company performance, corporate governance and corporate value etc. Second, the motives and legal characteristics of the equity pledge are studied.

Different from the existed articles, the novelty of this study lies in:

Firstly, from the perspective of research, this paper conducts a multi-angle analysis of the impact of controlling shareholder equity pledge on corporate value. Existing researches on the impact of equity pledge on corporate value are mostly based on the perspective of ownership and control, focusing on the separation of the two powers to study the cross-impact effect of equity pledge on ownership, control and corporate value. From the perspective of China’s current capital market, its practicality is not enough. This paper combines the perspective of corporate performance and equity balance to comprehensively study the impact of controlling shareholder equity pledge on corporate value.

Secondly, this study uses the equity multiplier to measure financial leverage replacing most of the existing research practices which applied the asset-liability ratio.

Third, this paper obtains the latest data and distinguishes the equity pledge sample and the controlling shareholder equity pledge sample. Furthermore, the empirical analysis is divided into two situations, not considering the equity pledge and considering the equity pledge. We include as much sample data as possible for empirical analysis to make the results more reliable.

1.3 Literature Review

Li et al. [1] found that the phenomenon of encroachment on the corporate assets has increased significantly after the controlling shareholder conducts the equity pledge in the listed companies. Hao and Liang [2] revealed that the greater the proportion of the controlling shareholder’s equity pledge, the more serious the separation of the two powers, and the more motivation to encroach on the corporate interests. It is especially true for privately held companies.

Bozec et al. [3] found that when the controlling shareholder’s cash flow rights and control rights are unified, they do not have a strong intention to damage corporate value. Joh [4] believed that the controlling shareholder enjoys a large degree of control due to the existence of the separation of the two powers, and they may use mergers and acquisitions to achieve the benefit transfer. The consequence reacts to the capital market, and we observe that the corporate share price will be negatively affected and fall. Ju [5] noticed that the greater the separation of the two powers, the lower corporate value in private enterprises, that is, the separation of the two powers has an amplification effect in private enterprises.

Yeh [6] found that when the corporate shareholders pledge the equity, it will aggravate the agency problem, and the pledge ratio is positively related to the agency
problem which causes corporate value to be negatively affected. Zheng et al. [7] suggested that when the ultimate controller of the company is in a difficult position, it is more likely to choose equity pledge financing, and controller has a stronger desire to extract company resources to meet its own capital needs and damage corporate value. Later, Xie et al. [8] further pointed out that major shareholders have stronger incentives to use the accounting policies for market value management after the equity pledge, which damages corporate value.

2. Methodology

The empirical part contains three parts. First, the impact of the controlling shareholder’s equity pledge on corporate value is passed on through the separation of the two powers. Second, the influence of the controlling shareholder’s equity pledge on the corporate performance is transmitted to corporate value. Last, we investigate the impact of controlling shareholders’ equity pledge on corporate value from the perspective of equity balance.

2.1 Research Hypothesis

2.1.1 The Influence of Controlling Shareholder Information on Corporate Value without Considering Equity Pledge

According to Claessens et al. [9], voting rights are used to measure the controlling power, and cash flow rights are used to measure the ownership. The equity pledge is mainly through affecting ownership, which in turn affects corporate value. According to La port et al. [10], the higher the cash flow rights owned by the controlling shareholder, the higher the sharing benefit, and the less likely to harm the corporate interests. In this case, the Hypothesis 1 of this paper is proposed:

H1A: The cash flow rights owned by the controlling shareholder are positively correlated with corporate value when other factors remain unchanged. As the controlling shareholder’s cash flow rights increase, corporate value will also increase. That is, there is an incentive effect.

H1B: The control rights owned by the controlling shareholder are positively correlated with corporate value when other factors remain unchanged. As the controlling shareholder’s control increases, corporate value will also increase.

Studies have shown that when control rights and cash flow rights are inconsistent, especially when the controlling shareholder has a higher proportion of control rights with low ownership, the cost of the interest encroachment is less. Assuming that there is profit-driven, rational controlling shareholders may engage in encroach-
tive impact on corporate value creation within a certain range and presents the “inverted U-shaped” change law. Based on this, we propose the Hypothesis 6 as follows:

H6: The balance of equity is beneficial to internal control and corporate governance when other factors are unchanged. Put another way, when there is equity balance, the negative effect of the controlling shareholder’s equity pledge on corporate value will be reduced.

### 2.2 Model Construction and Variable Definition

The data type in this paper is mixed cross-section data. We use multiple linear regression models to verify the linear relationship between related variables and test whether the hypotheses are true.

#### 2.2.1 The Influence of Controlling Shareholder Information on Corporate Value

This section builds a regression model for studying the relationship between the cash flow rights and control of the controlling shareholder and corporate value. According to the research of Claessens et al. [9], we use cash flow rights and control rights as the measurement of the ownership and control of the company by the controlling shareholder.

Model I:

\[
\text{TobinQ}_i = \beta_0 + \beta_1\text{Cash}_i / \text{Vote}_i + \beta_2\text{Lgsize}_i + \beta_3\text{Lev}_i + \beta_4\text{Growth}_i + \beta_5\text{Industry}_i + \beta_6\text{State}_i + \varepsilon
\]  

(1)

This model is applied to test the relationship between cash flow rights, control rights and corporate value, and to verify whether Hypothesis 1 is established.

Model II:

\[
\text{TobinQ}_i = \beta_0 + \beta_1\text{Cvv}_i + \beta_2\text{Lgsize}_i + \beta_3\text{Lev}_i + \beta_4\text{Growth}_i + \beta_5\text{Industry}_i + \beta_6\text{State}_i + \varepsilon
\]  

(2)

We employ this model to test the relationship between the separation of the two powers and corporate value, and to verify whether the Hypothesis 2 is hold.

Among them, TobinQ is used to measure the value of the company (the replacement cost is measured by the book value of the company’s total assets); Cash, Cvv, represent the controlling shareholder information which refers to the cash flow rights owned by the controlling shareholder and the separation of the two powers; Lev, is the equity multiplier, measuring the size of the corporate financial leverage; Lgsize, measures the size of the company which is the logarithm of the corporate total assets; Growth, represents the corporate future growth ability, and is measured by total operating income growth rate. Industry, denotes the industry in which the listed company is located. This paper divides the selected samples into 17 industries (excluding the financial industry) in concert with the 2012 edition of the Guidelines for the Classification of Listed Companies. State, is a dummy variable, and it is 0 for state-owned listed company and 1 for private listed company.

In line with Claessens et al. [9], this study selects cash flow rights as a measure of ownership, voting rights as a proxy of control rights, and the ratio of cash flow rights to voting rights as a measure of the separation of two powers. The sum of ownership in the control chains can be used to measure the cash flow rights. The ownership in each control chain is the product of the shareholding ratios on this chain. If the controlling shareholder’s shareholding ratio at each level of the control chain is Ri, then the cash flow right is \( \sum \prod R_i \).

Refer to Hao and Liang [3], the voting rights are expressed as the sum of the smallest current prices of voting rights at each level of the control chain, i.e. voting rights = \( \sum [\text{min}(R_{i1}, R_{i2}, \ldots, R_{in})] \). Ri is the voting right of the layer j on the control chain i.

The ratio of cash flow rights to voting rights is an indicator to measure the degree of separation of the two powers. Since the cash flow rights are always less than or equal to the voting rights, the value of the variable is between 0 and 1. The larger the value, the lower the degree of separation of the two powers.

#### 2.2.2 The Influence of Controlling Shareholder Pledge on Corporate Value

This part is mainly to construct a research model of the controlling shareholder’s equity pledge to corporate value. The first section considers the impact of the expansion of separation of the two powers caused by the equity pledge on corporate value; the second section is based on the corporate performance, indirectly measuring the impact of the equity pledge on corporate value. ROA is selected as the measure of company performance, and the controlling shareholder pledge rate (Pledge) and the major shareholding ratio (Stockrate) are used as control variables. The third section is to study the impact of controlling shareholder pledge on corporate value in the case of equity checks and balances, and the controlling shareholder’s equity pledge rate and equity balance Z are added as explanatory variables.

Model III:

\[
\text{TobinQ}_i = \beta_0 + \beta_1\text{Cash}_i / \text{Vote}_i + \beta_2\text{Lgsize}_i + \beta_3\text{Lev}_i
\]
\[ \beta_1 = \alpha_1 + \alpha_2 \text{Pledge}_{it} \]  

This model tests the relationship between the cash flow rights, control rights and corporate value under the condition that the controlling shareholder pledged equity to verify whether the Hypothesis 3 is true.

Model IV:
\[ \text{TobinQ} = \beta_0 + \beta_1 \text{Cvv}_{it} + \beta_2 \text{Lgsize}_{it} + \beta_3 \text{Lev}_{it} + \beta_4 \text{Growth}_{it} + \beta_5 \text{Industry}_{it} + \beta_6 \text{State}_{it} + \varepsilon \]  

This model measures the relationship between the change of the separation of the two rights caused by the controlling shareholder’s equity pledge and corporate value for Hypothesis 4. \text{Pledge} is an independent variable which represents the controlling shareholder’s equity pledge. Yeh et al, 2003 \cite{6} shown that when the corporate share price falls, the value of the pledged equity decreases and the pledgee will require the pledger to provide more protection to compensate the decline value of equity. It will make the controlling shareholder unreasonably uses the corporate related assets to maintain the stock price (that is, the market value management), so the equity pledge will expand the leverage effect of the control resulting in more serious agency problem and lower corporate value.

In Model III and Model IV, the \( \beta_1 \) is analyzed as follows:

1. If both \( \alpha_1 \) and \( \alpha_2 \) are greater than zero, then the controlling shareholder information is positively correlated with corporate value, and the more the equity is pledged, the more significant this positive correlation is.

2. If \( \alpha_1 \) is greater than zero and \( \alpha_2 \) is less than zero, then the controlling shareholder information is positively correlated with corporate value, and the less the equity is pledged, the more significant this positive correlation is.

3. If \( \alpha_1 \) is less than zero and \( \alpha_2 \) is greater than zero, then the controlling shareholder information is negatively correlated with corporate value, and the more the equity is pledged, the more significant this negative correlation is.

4. If both \( \alpha_1 \) and \( \alpha_2 \) are less than zero, then the controlling shareholder information is negatively correlated with corporate value, and the less the equity is pledged, the more significant this negative correlation is.

Model V:
\[ \text{ROA}_{it} = \beta_0 + \beta_1 \text{Pledge}_{it} + \beta_2 \text{Stockrate}_{it} + \beta_3 \text{Lgsize}_{it} + \beta_4 \text{Lev}_{it} + \beta_5 \text{Growth}_{it} + \beta_6 \text{Industry}_{it} + \beta_7 \text{State}_{it} + \varepsilon \]  

We apply this model to find out the correlation between the controlling shareholder’s equity pledge and the corporate performance for Hypothesis 5. Since the corporate performance has positive impact on corporate value, the impact of the controlling shareholder’s equity pledge on the corporate performance can indirectly detect the influence on corporate value which enables us to analyze the impact of controlling shareholder’s equity pledge on corporate value from the accounting perspective.

Model VI:
\[ \text{TobinQ} = \beta_0 + \beta_1 \text{Pledge}_{it} + \beta_2 \text{Stockrate}_{it} + \beta_3 \text{Lgsize}_{it} + \beta_4 \text{Lev}_{it} + \beta_5 \text{Growth}_{it} + \beta_6 \text{Industry}_{it} + \beta_7 \text{State}_{it} + \varepsilon \]  

\[ \beta_1 = \alpha_1 + \alpha_2 \text{Z}_{it} \]  

Model VI is a nested model, which verifies the impact of the controlling shareholder’s equity pledge on corporate value in the presence of equity checks and balances, and also verifies whether Hypothesis 6 is hold. \( \text{Z} \) is a measure of the equity balance which is obtained by dividing the sum of the shareholding ratio of the second to fifth largest shareholders by the shareholding ratio of the controlling shareholder. In other words, \( \text{Z} \) measures the balance of the remaining major shareholders of the company against the controlling shareholder.

3. Data

This paper selects a relatively complete sample of relevant information disclosure for the listed company in 2014-2017. The data is collected from the Wind Database, CSMAR Database, and the Choice Database. Specifically, the actual controller information and financial data of the required company are sourced from the CSMAR Database, the equity pledge data is derived from the Wind Database and the Choice Database. Nowadays, the laws and regulations related to the equity pledge of China’s capital market is not standardized for the announcement of the equity pledge. Therefore, the information related to the equity pledge disclosed in the market is not comprehensive, and the first-hand data collected is difficult to conduct research and analysis. To solve this problem, this article firstly combines the annual reports of the listed company and the announcement related to the equity pledge, and then manually proofread and improve relevant information.

In the data processing, we deal with data and obtain a total of 10,448 research samples as following steps:
(1) The listed companies with incomplete data or insufficient disclosure are excluded at first.
(2) Exclude financial and insurance companies because the particularity of these companies make them very different from other industries, which may affect the robustness of research conclusions.
(3) Exclude companies that are ST, *ST.
(4) Use Stata to perform a 1% level of Winsorize processing on the samples.

4. Results Analysis

4.1 Correlation Analysis

In this paper, the Pearson correlation coefficient is used to analyze the correlation between variables. Since there are three major types of models in this paper, the correlation between variables is discussed in three cases.

As is shown in Table 1, except for the cross terms, the correlation coefficients between almost all variables is less than 0.5. Therefore, for the controlling shareholder information and corporate value research model, there is no multi-collinearity problem.

In Table 2, the correlation coefficients are all less than 0.5, so there is no multi-collinearity problem in terms of the company performance and the controlling shareholder equity pledge ratio model. And judging from the correlation coefficients, there is a significant negative correlation between the controlling shareholder pledge ratio and the total return on assets, which is in line with our research hypotheses.

Table 1. Correlation Analysis between Controlling Shareholder Information and Corporate Value

<table>
<thead>
<tr>
<th>Variable name</th>
<th>TobinQ</th>
<th>Cash</th>
<th>Vote</th>
<th>Cvv</th>
<th>Pledge *Cash</th>
<th>Pledge *Vote</th>
<th>Pledge *Cvv</th>
<th>ROA</th>
<th>Lgsize</th>
<th>Lev</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>TobinQ</td>
<td>1</td>
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<tr>
<td>Cash</td>
<td>-0.060</td>
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<tr>
<td>Vote</td>
<td>-0.087</td>
<td></td>
<td>0.862</td>
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<tr>
<td>Cvv</td>
<td>0.038</td>
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<td>0.520</td>
<td>0.061</td>
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<tr>
<td>Pledge</td>
<td>-0.070</td>
<td>-0.14</td>
<td>-0.078</td>
<td>-0.151</td>
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<tr>
<td>Pledge, *Cash</td>
<td>-0.061</td>
<td>0.492</td>
<td>0.434</td>
<td>0.230</td>
<td>0.6928</td>
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<tr>
<td>Pledge, *Vote</td>
<td>-0.081</td>
<td>0.297</td>
<td>0.444</td>
<td>-0.12</td>
<td>0.7910</td>
<td>0.905</td>
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<tr>
<td>Pledge, *Cvv</td>
<td>-0.050</td>
<td>0.096</td>
<td>-0.06</td>
<td>0.292</td>
<td>0.8593</td>
<td>0.803</td>
<td>0.687</td>
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<tr>
<td>ROA</td>
<td>0.267</td>
<td>0.096</td>
<td>0.113</td>
<td>0.032</td>
<td>-0.106</td>
<td>-0.008</td>
<td>-0.021</td>
<td>-0.080</td>
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<tr>
<td>Lgsize</td>
<td>-0.608</td>
<td>0.190</td>
<td>0.227</td>
<td>-0.02</td>
<td>0.0804</td>
<td>0.112</td>
<td>0.147</td>
<td>0.042</td>
<td>-0.089</td>
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<tr>
<td>Lev</td>
<td>-0.319</td>
<td>0.045</td>
<td>0.060</td>
<td>-0.04</td>
<td>0.1067</td>
<td>0.133</td>
<td>0.157</td>
<td>0.071</td>
<td>-0.367</td>
<td>0.435</td>
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<tr>
<td>Growth</td>
<td>0.0214</td>
<td>-0.02</td>
<td>-0.02</td>
<td>0.002</td>
<td>0.0692</td>
<td>0.074</td>
<td>0.0712</td>
<td>0.075</td>
<td>0.188</td>
<td>0.051</td>
<td>0.0093</td>
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</tbody>
</table>

Note: *** indicates significant at 1%, ** indicates significant at 5%, and * indicates significant at 10% (the same below).

Table 2. Correlation Analysis between Company Performance and Controlling Shareholder Equity Pledge Ratio

<table>
<thead>
<tr>
<th>Variable name</th>
<th>ROA</th>
<th>Pledge</th>
<th>Stockrate</th>
<th>Lgsize</th>
<th>Lev</th>
<th>Growth</th>
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</thead>
<tbody>
<tr>
<td>ROA</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Pledge</td>
<td>-0.106***</td>
<td>1</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
4.2 Regression Analysis

4.2.1 Influence of Controlling Shareholder Information on Corporate Value without Considering Equity Pledge

Table 3 reports the regression results of Model I. We find that the regression coefficients of the independent variables Cash and Vote are 1.2130 and 1.0762, respectively, and are significant at the level of 1% which indicates that the Hypothesis 1 is true. That is to say, the cash flow rights and control rights are positively correlated with the corporate value. With the increase of cash flow rights, the incentive effect is enhanced. And the accompanying increase in control reduces agency problems and conflicts of interest to a certain extent, which helps to improve the value of the company. From the perspective of control variables, there is a significant negative correlation between company size and financial leverage and corporate value, in which the negative correlation between company size and corporate value is stronger. In terms of the growth rate of operating income, the regression coefficient is significantly positive at the level of 1% indicating that the growth rate of operating income is positively correlated with corporate value. From the perspective of property right character, the value of private companies as a whole is higher than that of state-owned enterprises.

Table 4. Regression result of Model I

<table>
<thead>
<tr>
<th>Independent variable: Cash</th>
<th>Independent variable: Vote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Coefficients t value</td>
</tr>
<tr>
<td>Constant</td>
<td>27.3813 *** 51.38</td>
</tr>
<tr>
<td>Cash</td>
<td>1.213 *** 9.61</td>
</tr>
<tr>
<td>Vote</td>
<td>——</td>
</tr>
<tr>
<td>Lgsize</td>
<td>-2.616 *** -46.34</td>
</tr>
<tr>
<td>Lev</td>
<td>-0.112 *** -5.02</td>
</tr>
<tr>
<td>Growth</td>
<td>0.233 *** 4.43</td>
</tr>
<tr>
<td>Industry State</td>
<td>Control 0.577 *** 14.77</td>
</tr>
<tr>
<td>Samplesize</td>
<td>10.448</td>
</tr>
<tr>
<td>F value</td>
<td>1018.61 ***</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.3879</td>
</tr>
</tbody>
</table>

Note: *** indicates significant at 1%, ** indicates significant at 5%, * indicates significant at 10%; model results have been tested for heteroscedasticity and processed.

In Table 5, the Cvv’s coefficient of Model II is 0.4035, and it is significant at the level of 1%, which can prove that the Hypothesis 2 is hold, that is, under the same conditions, the degree of separation between cash flow rights and control rights is negatively correlated with corporate value.
Table 5. Regression result of Model II

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficients</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>26.8743**</td>
<td>48.59</td>
</tr>
<tr>
<td>Cvv</td>
<td>0.4035***</td>
<td>4.39</td>
</tr>
<tr>
<td>Lgsize</td>
<td>-2.5537***</td>
<td>-4.47</td>
</tr>
<tr>
<td>Lev</td>
<td>-0.1184***</td>
<td>-5.32</td>
</tr>
<tr>
<td>Growth</td>
<td>0.2244</td>
<td>4.29</td>
</tr>
<tr>
<td>Industry</td>
<td>control</td>
<td>control</td>
</tr>
<tr>
<td>State</td>
<td>0.5253***</td>
<td>13.73</td>
</tr>
</tbody>
</table>

Samplesize: 10,448

F value: 999.95***

Adjusted $R^2$: 0.3839

4.2.2 The Influence of Controlling Shareholder Pledge on Corporate Value

As is shown in Table 6, all variables except the financial leverage variable $Lev$ are significant at the 1% level. The main independent variables’ regression coefficients are positive, but the regression coefficients of the cross term are significantly negative which is consistent with the case of $\alpha_1 > 0$, $\alpha_2 < 0$ proposed in the model construction part. That is to say, the cash flow rights and control rights owned by the controlling shareholder are positively correlated with corporate value, and the less the equity is pledged, the more significant the positive correlation is.

Table 7. Regression result of Model IV

<table>
<thead>
<tr>
<th>Variable nature</th>
<th>Variable name</th>
<th>Regression coefficients</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant term</td>
<td>Constant</td>
<td>29.3885***</td>
<td>29.90</td>
</tr>
<tr>
<td>Independent variable</td>
<td>Cvv</td>
<td>0.1079</td>
<td>0.76</td>
</tr>
<tr>
<td>Cross term</td>
<td>Pledge1* Cvv</td>
<td>-0.3743***</td>
<td>-3.27</td>
</tr>
<tr>
<td></td>
<td>Lgsize</td>
<td>-2.8195***</td>
<td>-27.39</td>
</tr>
<tr>
<td></td>
<td>Lev</td>
<td>-0.0195</td>
<td>-0.49</td>
</tr>
<tr>
<td>Control variable</td>
<td>Growth</td>
<td>0.2687***</td>
<td>3.89</td>
</tr>
<tr>
<td></td>
<td>Industry</td>
<td>control</td>
<td>control</td>
</tr>
<tr>
<td></td>
<td>State</td>
<td>0.5543***</td>
<td>6.97</td>
</tr>
</tbody>
</table>

Sample size: 4,402

F value: 318.45***

Adjusted $R^2$: 0.3587

In Table 7, the cross-term regression coefficient is significantly negative. This is in line with the case of $\alpha_1 > 0$, $\alpha_2 < 0$ proposed in the model construction part.
\( \alpha_2 < 0 \) proposed in the model construction part. It also indicates that the separation of the two powers is negatively correlated with the corporate value, and the controlling shareholder equity pledge will further weaken corporate value.

### 4.2.3 Study on the Impact of Controlling Shareholder Equity Pledge on Corporate Value based on Accounting Perspective

#### Table 8. regression result of Model V

<table>
<thead>
<tr>
<th>Variable nature</th>
<th>variable name</th>
<th>Regression coefficients</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant term</td>
<td>Constant</td>
<td>-0.1141***</td>
<td>-6.90</td>
</tr>
<tr>
<td>Independent Pledge</td>
<td>-0.0155***</td>
<td>-6.79</td>
<td></td>
</tr>
<tr>
<td>Variable Stockrate</td>
<td>0.0523***</td>
<td>9.50</td>
<td></td>
</tr>
<tr>
<td>Lgsze</td>
<td>0.0167***</td>
<td>9.64</td>
<td></td>
</tr>
<tr>
<td>Control variable Lev</td>
<td>-0.0157***</td>
<td>-23.18</td>
<td></td>
</tr>
<tr>
<td>Industry Growth</td>
<td>0.0192***</td>
<td>13.94</td>
<td></td>
</tr>
<tr>
<td>Industry State</td>
<td>0.0154***</td>
<td>5.93</td>
<td></td>
</tr>
<tr>
<td>Number of samples</td>
<td>4,402</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F value</td>
<td>162.81***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>0.1808</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the regression result of Model V, the regression coefficient of the equity pledge ratio of the controlling shareholder is -0.0155 and it is significant at the level of 1%, indicating that the controlling shareholder’s equity pledge has a significant negative correlation with the corporate performance. After adding the control variable, \( \text{Stockrate} \) false, its regression coefficient is significantly positive, which means that there is a significant positive correlation between equity concentration and company performance. This proves that Hypothesis 5 is hold. That is, the shareholding pledge ratio of the controlling shareholder is negatively correlated with the company’s performance under the condition that other factors remain unchanged, but the concentration of ownership will weaken this negative correlation. From the perspective of other control variables, company size and operating income growth rate have a positive impact on company performance, while financial leverage is negatively correlated with company performance. In terms of the property nature, State’s regression coefficient is significantly positive, which indicates that the performance of private enterprises is superior to state-owned enterprises as a whole.

#### 4.2.4 The Impact of Controlling Shareholder Equity Pledge on Corporate Value When Considering Equity Checks and Balances

#### Table 9. regression result of Model VI

<table>
<thead>
<tr>
<th>Variable nature</th>
<th>Variable</th>
<th>Coefficient</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant term</td>
<td>Constant</td>
<td>29.308***</td>
<td>31.06</td>
</tr>
<tr>
<td>Independent Pledge</td>
<td>-0.377***</td>
<td>-2.91</td>
<td></td>
</tr>
<tr>
<td>Cross term Pledge ( Z )</td>
<td>0.1758*</td>
<td>1.89</td>
<td></td>
</tr>
<tr>
<td>Stockrate</td>
<td>1.2693***</td>
<td>4.75</td>
<td></td>
</tr>
<tr>
<td>Lgsze</td>
<td>-2.8479***</td>
<td>-28.08</td>
<td></td>
</tr>
<tr>
<td>Control variable Lev</td>
<td>-0.0211</td>
<td>-0.52</td>
<td></td>
</tr>
<tr>
<td>Growth</td>
<td>0.2618***</td>
<td>3.80</td>
<td></td>
</tr>
<tr>
<td>Industry Control</td>
<td>control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>0.5650***</td>
<td>7.26</td>
<td></td>
</tr>
<tr>
<td>Number of samples</td>
<td>4,402</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F value</td>
<td>280.58***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It can be seen from Table 9 that the regression coefficient is -0.3770, and it is significant at the level of 1%, which indicates that the controlling shareholder’s equity pledge ratio is significantly negatively correlated with corporate value. While considering the balance of equity, cross-terms between equity balance and pledge ratio of the controlling shareholder is significantly positive which reveals that the balance of equity weakens the negative effect of the controlling shareholder’s equity pledge on corporate value. From the perspective of control variables, equity concentration and operating income growth rate are significantly positively correlated with corporate value.

### 4.3 Suggestion

According to the findings of this article, the controlling shareholder’s equity pledge has a negative impact on corporate value and company performance which increases the risk of investment and form a bad expectation of the financing behavior, and then affect the further development of China’s capital market. Therefore, this paper proposes the following suggestions for problems arising in the process of equity pledge.

1. Regulators should formulate regulations to improve the information disclosure of equity pledge. In addition, the specific information on the equity pledge project should also be properly disclosed, which will help strengthen the supervision of the project and prevent the abuse of applying financing method of equity pledge.

**DOI:** https://doi.org/10.30564/jesr.v3i1.1557
(2) It is essential to further broaden the financing channels of private enterprises and alleviate the financing difficulties of private enterprises. The most important influencing factors of equity pledge are the less financing methods and financing difficulties. Under this circumstance, many enterprises are forced to choose equity pledge for financing which leads to a vicious circle.

(3) From the perspective of the company itself, internal control should be strengthened to improve internal governance. The company should properly improve the shareholding structure, and introduce strategic investors as equity balancers to supervise and restrict the behavior of the corporate controlling shareholders and to prevent the emergence of agency problems. The corporate supervisory department can set the upper limit of the pledge ratio. In addition, the responsibilities of the corporate board of supervisors should be strengthened to supervise equity pledge.

(4) From the perspective of stakeholders, they should strengthen supervision of the company and respond in a timely manner. As the corporate creditors, when lending to the company, corresponding provisions should be established to restrict the equity pledge of the corporate important shareholders. For other small and medium shareholders, the investment should be withdrawn in time if the purpose of the funds is unknown.

5. Conclusion

This paper uses nested models and multiple linear regression models to analyze the empirical data on equity pledge and fundamentals of sample companies from 2014 to 2017. In the end, the following conclusions are drawn:

(1) Without considering the pledge of equity, the cash flow rights and voting rights owned by the controlling shareholder are positively related to corporate value. However, when the separation of the two rights occurs, the controlling shareholder’s cost of encroachment is reduced due to the separation between the cash flow rights and the voting rights. Then, the agency problem occurs which leads to the decrease of corporate value.

(2) The controlling shareholder’s equity pledge aggravates the separation of the two power, which weaken the incentive effect and strengthen the encroachment effect, and eventually lead to the reduction of corporate value.

(3) From the perspective of the corporate performance conduction chain, the controlling shareholder’s equity pledge behavior will affect the corporate performance and corporate value through conduction.

(4) Seeing from the research on equity checks and balances, when there exists equity balance, the controlling shareholder’s equity pledge will be supervised and restricted by other major shareholders, thereby reducing the possibility of agent problems, which in turn reduce the negative impact on corporate value. The higher the equity balance, the weaker the negative impact of the controlling shareholder’s equity pledge on corporate value.

References


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