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Determinants of Corporate Investments Decision Making: Evidence from Commercial Banks in Ethiopia

Sofoniyas Mekonnen Fekadu[1] Deresse Mersha Lakew[2] Lemessa Bayissa Gobena[3]

KEY WORDS

Investment decision, Institutional quality, macroeconomic, firm- specific.

ABSTRACT

This study aims to analyze institutional quality, macroeconomic, and firm-specific determinates of corporate investment decision-making. The paper uses the panel regression technique with data for the period of 2013 to 2022 for Ethiopian commercial banks. The positivism research paradigm and explanatory research design were used for this study. The data were collected from the yearly financial reports of the sampled commercial banks, the annual reports of the Ministry of Finance, and the World Bank data websites. Furthermore, a sample of sixty (16) commercial banks was selected from the total population of 30 commercial banks. The method of data analysis started by estimating the pooled OLS model and subsequently using the Breusch-Pagan Lagrangian Multiplier (LM) test to check the suitability of pooled OLS for this model; otherwise, the model will be tested with random effects and subsequently diagnosed using the Hausman test for the correlated random effects, which give hints on the suitability of either random or fixed effects for the model. The random effect model was found to be appropriate for this study objective based on the model test results. The regression result of the study indicated that institutional quality factors such as political stability and rule of law have a positive and statistically significant effect on commercial bank investment decisions. On the other hand, government effectiveness and regulatory quality have a negative and statistically significant effect on the investment decisions of commercial banks. Among the macroeconomic factors, inflation has a negative and statistically significant effect on the investment decisions of Ethiopian commercial banks. On top of these firm-specific variables, only bank size has a negative effect, and, if not at 5%, at 10%, it has a statistically significant effect on the investment decisions of commercial banks.

[1] PhD Candidate- Ethiopian Civil Service University * *Correspondence* sofo.mekonnen@gmail.com,
[2] Associate Professor- Ethiopian Civil Service University
[3] Assistant Professor- Ethiopian Civil Service University

1. Introduction

The banking sector is a pivotal segment in many countries; hence the need for continuous implementation of adequate policy measures and reforms to ensure that the banking sector performs its function efficiently (Sufian & Habibullah, 2010). According to Levine (2005), the banking sector performs five functions which can facilitate economic growth. These functions are (i) providing ex ante information about possible investments and allocate capital, (ii) monitoring investments and exert corporate governance after providing credit, (iii) facilitating trading, risk diversification, and risk management (iv) mobilizing and pooling deposits, and (v) facilitating the exchange of goods and services. Therefore, the above functions of the banking sector directly or indirectly correlated with corporate strategies (Mokhova & Zinecker, 2014). The macroeconomic parameters including the legal environment of the country and firm specific factors have a significant impact on the business entities operating in the country ((Lensink & Meesters, 2007). Adequate perception and assessment of institutional quality, macroeconomic and firm specific factors related to the banks' environment by managers should be done more adequately to enable them to make effective decisions for companies (Surmanidze, 2017). The decision regarding the corporate investment is crucial to validate the continuity of firm activities. Moreover, the role of corporate investment in the development of overall economic condition is also crucial (Onwe, 2014). It creates the new opportunities of employment, enhances the capital circulation and promotes the exports of a country. But there exist some factors, which affect the level of investment. These factors are institutional quality, macroeconomic and firm specific. The institutional quality is instruments or constraints determining the interactions between parties in social, political, or economic settings (North, 1990). Fukuyama (2008) six clusters of institutional quality indicators such as political stability, government effectiveness, regulatory quality, control of corruption, rule of law and voice and accountability are important factors for investment decisions of commercial banks. Institutional quality could be a determinant of investment decision because good governance is associated with higher economic growth and development, which has the tendency to attract more investment. Poor and weak institutions would enable corruption among others to add to investment costs and reduce profits which is likely increase the sunk cost of doing business makes investors highly sensitive to uncertainty, including the political uncertainty that arises from poor institutions (Lemma & Negash, 2013). Moreover, corporate investment decisions have a close link with the macroeconomic condition of a country. Specifically, volatile economic condition can dynamically affect firm decisions. In this regard, many studies have previously explored the impact of economic uncertainty on corporate investment decisions (Xie et al. 2021). Like economic uncertainty, there exist other economic factors, e.g., inflation rate, foreign direct investment, financial sector development, and economic growth that can affect the firm investment decisions. In addition, the evidence that firm-level factors influence investment decisions of sample firms suggests that corporate (financial) managers have some controls over capital structure, and hence cost of capital and value (Fisman & Svensson, 2007). The firm specific factors include bank capital, profitability, efficiency, leverage, stability, and ownership (Al-Khouri, 2016), bank type (Albaity et al. 2021) which affect the investment decision of commercial banks.

According to Adedoyin and Sobodun (1991) investment decision is the principal banking business decision making activities. Hence, it requires considerable skills and knowledge to administer those activities to banks managements. Investment decision appreciates transparency of information and trustworthiness in a country or in a market. They are afraid of risk factors such as market uncertainty, lack of market knowledge and lack of investment experience (Trappey et al. 2007), which are likely to make firms underinvest (Volker et al. 2009).

In the context of Ethiopia, among many previous empirical research conducted in Ethiopia, there are few exceptions that give better attention to external factors such as Fola (2015) who regressed ROA against GDP, lending rate and Exchange Rate and many Bank specific factors. Mezgebu (2017) also regressed ROA against GDP, money supply and Inflation rate together with many internal factors and finally Alemu (2015) found out the relationship between GDP, exchange rate and inflation rate and many internal factors on profitability of commercial banks. Although, the empirical research considered some external factors together with a great number of internal factors and still limited research study conducted by considering institutional quality, macroeconomic factors. So, this study will try to fill this gap by taking the effect of institutional quality, macroeconomic and firm specific factors on Ethiopian commercial banks investment decisions. In addition, to the best of my knowledge, there was no single study found in Ethiopia that jointly investigated the effect of institutional quality, macroeconomic and firm specific factors on investments decision making. Therefore, the major contribution of this research because the current literature does not offer yet an econometric analysis of the combined effect of institutional quality, macroeconomic and firm specific factors on the investment decision making of commercial banks. In doing so, this study is different because it analyzes the combined effect of institutional quality, macroeconomic and firm-specific factors on the investments decision making of Ethiopian commercial banks.

The objective of this study is to investigate institutional quality and macroeconomic and firm-specific determinates of corporate investment decision-making of Ethiopian commercial banks.

2. Literature Review and Hypotheses

2.1 Theories

A. Real options theory

Conventional literature on corporate finance has also been criticized for overlooking the effects of uncertainty on corporate investment behavior. Recent research that aims to investigate the causes of corporate investment has emphasized the significance of uncertainty related to companies' prospects in order to explain the failures and fix the limitations of previous models (Baum et al., 2008). The real-options approach to irreversible investments is often regarded as the most viable avenue to solve the issue of the link between investment and uncertainty among the numerous competing theoretical approaches. It offers a far richer dynamic framework for examining corporate investment behavior in ambiguous situations because it acknowledges the option value of delaying an investment choice in order to expect the arrival of new information regarding market conditions (Morikawa, 2016).

B. The Internal Funds Theory of Investment

Tinbergen (1938) argued this theory for the first time. Following the conjectures of the internal funds theory of investment, the decision related to the desired capital stock or investment is mainly dependent upon profit volume. Investment decisions are presumably attached to profitability capacity, as it ensures the availability of funds for new investments. Alternatively, the corporate managers often make the investment following the availability of both internal and external funds.

C. Cash Flow Theory

It has been believed that current and past cash flows and profits serve as reliable indicators of expected future earnings, which in turn influence investment decisions (Bischoff, 1971). Furthermore, cash flow is viewed as a source of funding; thus, given the imperfect state of the market, the cost of funding for the company increases when internal funds run out. The management and information theoretic approaches to investing were the most recent, according to Cherian (1996). Both strategies can be seen as contemporary iterations of liquidity theory since they place a strong emphasis on internal finance's position as the primary driver of investment.

D. Neoclassical Theory

According to the Neo-Classical theory, one of the key factors influencing investment is the interest rate. The neoclassical approach, in opposition to the accelerator model, postulates that the desired stock is contingent not only on the planned production but also on the ratio of the output price to the implicit rental price of capital goods services (Bischoff, 1971). It basically comes from a process of maximizing profits given a Cobb-Douglas production function targeted at desired capital. According to Bodie, Alex, and Marcus (2009), supply-side (neoclassical) economists contend that cutting tax rates will encourage greater investment and increase the motivation to work, while Keynesian (demand-side) economists focus on how taxes affect consumption and demand. Consequently, the main way that monetary policy affects interest rates is how it functions. Money supply expansions reduce interest rates, which in turn boost demand for investments (Galbraith, 1987).

2.2 Empirical Review

Theoretical and empirical literature has emphasized the connections between investment and institutional quality. The evidence indicating the influence of country-level factors (e.g., institutional quality) on capital investment suggests that regulators and policymakers can control corruption, regulate effectively, and uphold the rule of law to influence capital structure and investment decisions, and consequently the cost of capital and firm value (Shleifer & Vishny, 1993). Consequently, regulators and legislators may have an impact on the standard of corporate governance at the firm level by influencing the investment decisions of businesses (Lemma & Negash, 2013). It has been suggested theoretically that it is unclear how institutional quality affects a firm's level of investment. For instance, according to some writers, corruption weakens the institutional environment's structure, increases operating costs, breeds uncertainty, and discourages investment (Shleifer & Vishny, 1993).

The macroeconomic condition of a country has a close link with many corporate investment decisions. The economic environment of a country in which a firm operates can asymmetrically change investment decisions. The literature has provided some empirical evidence on the relevant role of macroeconomic factors in determining the firm-level decisions. For instance, the study of Dmello and Toscano (2020) has investigated the effect of various economic factors on trade credit activities of enterprises and found that corporate firms actively react to any change in economic uncertainty condition of a country. Similarly, the analysis of Chow et al. (2018) suggested that the macroeconomic uncertainty of a country has an inverse relationship with the investment decision of firms.

Investment decision requires a strong motivation for managers due to the slow payback period and more chances of default due to high uncertainty of return. Moreover, such investment requires many funds that a firm can bind for the long term (Farooq et al. 2021). Therefore, corporate investment is a crucial firm-level decision that determines the financial success of a firm. There exist many factors e.g., firm size, financial

leverage, and managerial board characteristics that can influence this decision (Agyei-Mensah 2021).

2.3 Hypotheses

A. Institutional Quality Factors

Political stability increases financial access and depth by enabling financial intermediaries to function freely and profitably and by directing financial resources toward successful ventures (Dutta & Meierrieks, 2021; Girma & Shortland, 2008). Political stability inspires trust in investors, encouraging them to make larger investments and launch new ventures. In turn, this makes financial intermediation more in demand within an economy. However, political unrest and autocratic regimes undermine investor confidence in the financial system and impede the expansion of bank investment (Hasan et al., 2009).

H1: *Political stability has significant positive effect on investment growth of commercial banks.*

Government effectiveness reflects the quality of public services, the civil servants' independence from political pressure, the quality of administration, and the credibility of the government's decisions. The public sector is more accountable when government efficiency is better (Huther & Shah, 1998). Moreover, this guarantees a more precise alignment of services with home preferences and business requirements. The results of McKinney and Moore (2008) and Mauro et al. (1998) demonstrate that greater governance promotes development outcomes, including investment, economic growth, and foreign direct investment. Moreover, it lowers asymmetric information and transaction costs, which enhances the distribution of resources (Williamson, 1981; Ho & Michaely, 1988). Therefore, investors benefit from a successful government in the majority of circumstances. In contrast, a low degree of governance effectiveness may have a negative effect on the banks' investment activities.

H2: *Government effectiveness has significant positive effect on commercial banks' investment growth.*

Regulatory quality and rule of law it encourages the growth of the private sector and lowers the cost of doing business in an economy (Feng &Yu, 2020). Over time, countries have also implemented reforms in governance, legal, political, and regulatory frameworks in an effort to create an environment that is favorable for investors (Bissoon, 2011). Regulatory quality reflects the ability of the government to enact policies and regulations that are favorable to the market and that promote the growth of the private sector; additionally, regulatory quality lessens the opportunistic profit-seeking behavior of banks (Karikari et al., 2021). The effectiveness of a nation's justice system, which minimizes investment risk, is referred to as the rule of law. Ineffective regulatory quality and the rule of law worsen the banking sector's investment risk.

H3: *Regulatory quality has significant positive effect on investment growth of commercial banks*

H4: *Rule of law has significant positive effect on investment growth of commercial banks*

While the relationship between corruption and investment growth is debatable, the term "corruption" refers to the abuse of power. Theoretically, corruption can serve as a "helping hand" or a "grabbing hand." According to the "grabbing hand" thesis, corruption drives up production costs by funding graft, which drives away investment (Sadhon Saha, Md. et al., 2022). In contrast, the helping hand hypothesis states that corruption functions as a grease that boosts investment and decreases bureaucratic delay (Leff, 1964). Thus, while some writers (Barth et al., 2009; Chen et al., 2013) demonstrate that corruption may enhance investment performance, others contend that it has a detrimental impact on the bank's investment activities.

H5*: Control corruption has significant positive effect on commercial banks investment growth.*

Voice and accountability it provides political institutions that decide economic policies with checks and balances (Hasan et al., 2009). Acemoglu and Robinson (2012) make a distinction between "extractive institutions," which have power concentrated in a small number of elites, and "inclusive institutions," which have a wider distribution of power. The majority of African nations inherited extractive institutions from their colonial powers, which are linked to distortionary macroeconomic policies and political and economic instability (Acemoglu et al., 2003). The banking sector's efficiency, competition, and investment activities are boosted by political institutions, voice, accountability, and democracy, which restrict state interference and repression in financial markets (Karikari et al., 2021).

H6: *Voice and accountability has significant positive effect on commercial banks investment growth.*

B. Macroeconomic Factors

Real Gross domestic product it is a widely used economic indicator that represents the entire economic activity inside the economy and is adjusted for inflation. It makes sense that a robust economy would increase demand for products and services, which would increase investment across the board. The GDP has a significant impact on the economy as a whole, but it can also have an impact on the core decisions made by corporations. During a boom, businesses increase their investments in more lucrative endeavors in order to secure a profit (Becker, 2006). According to Valadkhani (2009), corporate investment decisions are negatively impacted by a threshold decline in the GDP growth rate. Additionally, a higher GDP growth rate boosts the economy as a whole, which lowers operating costs and makes doing business easier. The ease of doing

business attracts the attention of more investors (Tokuoka, 2013). This brief discussion argued that:

H7: *Real gross domestic product has significant positive effect on commercial banks investment growth.*

A general and persistent increase the price level of all products and services in an economy results in inflation, which is measured as a decrease in the purchasing power of a currency and is typically stated as an annual percentage change in the consumer price index (Asante, 2000). The strong rate of inflation is a sign that money is losing value. One important macroeconomic factor that influences the many economic activities in a nation is its inflation rate. According to Ayyoub, Chaudhry, and Farooq (2011), it has an indirect impact on commercial activity in any nation by affecting economic growth. According to Fischer's (2013) analysis, there is a negative correlation between corporate investment and the inflation rate because of the large risks and highly uncertain economic conditions. Omay and Kan (2010) highlighted the fact that a high inflation rate piled a lot of economic pressure on firms and forced them to extract their investment. In addition, other empirical findings also suggest an inverse relationship (Olanipekun, 2013; Onwe & Olarenwaju, 2014; Valadkhani, 2009).

H8: *Inflation rate has significant negative effect on commercial banks bank investment growth*

Corporate taxes are known to distort investment plans by lowering the after-tax returns to new investments; a large body of literature, beginning with Hall and Jorgensen (1967), has attempted to evaluate the empirical relevance of such distortions. There is, however, another, largely unexplored, way that corporate taxes can affect investment: if financing frictions make raising external capital expensive, a firm's ability to invest may be limited by the amount of cash flow it can generate internally; corporate taxes may then impact investment by lowering the amount of cash flow a firm has available for investment (Asingwa E., 2012); De Mooij et al. (2001); and Meg (2008) all found a negative relationship between corporate taxation and the investment growth of banks. Therefore, it is valid to develop a hypothesis that:

H9: Corporate income tax has significant negative effect on commercial bank investment growth.

C. Firm- Specific Factors

Cash-flow employed as a stand-in for a company's internal net value. The total of net income after taxes, depreciation, and amortization produces it. This variable is extracted from the income statements and balance sheets of businesses. When a company has sufficient cash inflows, it can use those funds for investment activities, which makes cash flow a crucial factor in determining the company's investment decisions (Danish Ahmed, 2022). Theoretically, there are three reasons why cash flow has a positive impact on investment, according to Lewellen J. L. (2016): i) internal funds are less expensive than external funds; ii) managers may overspend available internal funds; and iii) cash flow may be associated with investment. Thus, the investment-cash flow sensitivity can be interpreted because of financial constraints (Gatchev V. P., 2010) or the result of managerial risk aversion to excess debt, managerial discretion, and overinvestment (Degryse, 2006).

H10: *Cash flow has significant positive effect on commercial banks investment growth.*

Bank size it is the total value of a company's assets. Studies by Adele and Ariyo (2008), Jangili and Kumar (2010), and Li et al. (2010)) demonstrate the substantial beneficial influence that firm size has on banks' investment growth. The rationale is that big businesses ought to be more diversified, have more steady cash flows, and have easier access to outside funding sources than smaller ones. As a result, incentive investment activities follow. It is therefore anticipated that this variable will be related to investment.

H11: *Bank size has significant positive effect on commercial banks investment growth.*

Fixed capital intensity represents asset tangibility. In this study, the ratio of fixed assets to total assets reflects the fixed capital intensity of the firm's operations. The same proxy is also used by Shah and Hijazi (2004), Hijazi and Tariq et al. (2006), and Saquido (2003) to measure fixed capital intensity. Further investments may be limited by setup costs associated with large, fixed capital expenditures. A growth in fixed capital indicates that there is a high level of market demand for the product, prompting the company to make investments in fixed assets to meet its needs.

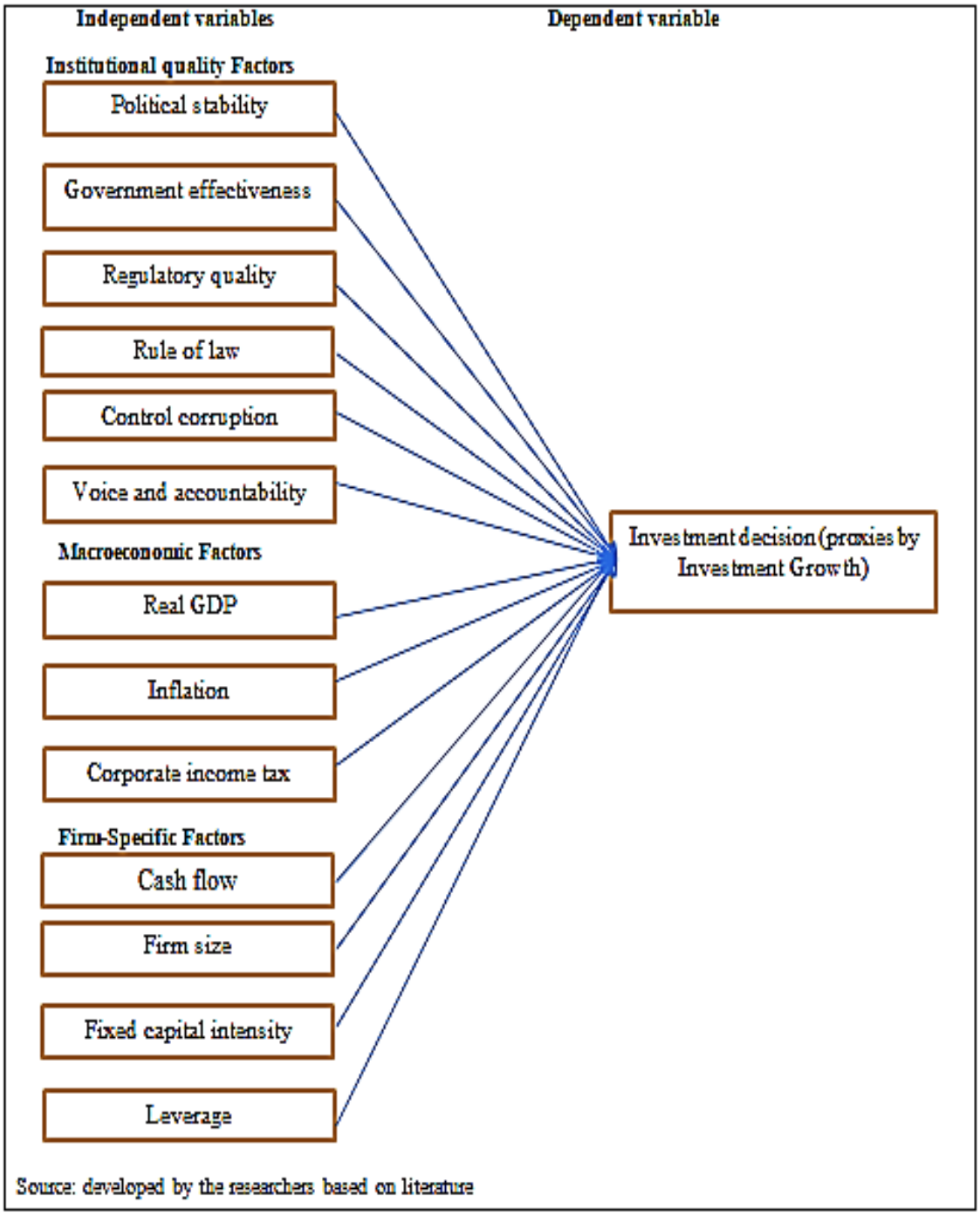
***H12*:** Fixed capital intensity has significant negative effect on commercial banks investment decision.

Leverage is the ratio of total assets to total liabilities. The balance sheets of each company are used to determine this variable. Leverage might have a negative impact on corporate investment decisions. This means that each increase in the level of leverage decreases investment decisions. A company that has high leverage means that the company uses high debt, thereby reducing investment decisions. This is due to the large amount of debt the company has, so it will reduce cash flow because of the interest costs paid (Ahmed, 2022).

H13: Leverage has significant negative effect on commercial banks investment decision

2.4 Conceptual Framework

Based on the theories and empirical literatures reviewed in the above section, we developed the following conceptual framework.



3. Materials and Methods

3.1 Research Paradigm

Healy and Perry (2000) identified four categories of research paradigms: interpretivism, realism, critical theory, and positivism. According to Healy and Perry (2000), positivism is employed in quantitative research, whereas the other three are used in qualitative research. Due to the quantitative nature of this research study, the researchers use a positivist research paradigm. The scientific perspective of the world is expressed through positivism (Pawlikowski, Rico, & Van Sell, 2018). According to Alharahshah and Pius (2020), positivist research philosophy centers on the researcher's use of observed reality within society to generalize.

3.2 Research Approach

Based on the positivism research paradigm and the nature of the data, this research study uses a quantitative research approach. Quantitative research can be used to find patterns and averages, make predictions, test causal relationships, and generalize results to wider populations (Fitzgerald & Howcroft, 1998).

3.3 Sampling Design

The purpose of this study is limited to assessing the effect of institutional quality, macroeconomic, and firm-specific factors on independent variables. investment decision making of commercial banks in Ethiopia by using panel data for ten years (2013- 2022G.C). A sample of Sixty (16) commercial banks were selected from the population of 30 commercial banks. It represents 53 percent of the existing commercial banks. In other words, the entire population of commercial banks that has existed for at least the last ten years is selected. Secondary data were collected from their 10 years' financial reports, world governance indicators, and macro data. Therefore, pooling the cross-sectional data for 10 years for 16 commercial banks, there are a total of 160 (160) observations in the regression analysis. For this reason, using purposive sampling, the selected banks are the Commercial Bank of Ethiopia, Dashen Bank, Awash Bank, Bank of Abysinya, Wegagen Bank, Hibret Bank, Abay Bank S. C., Addis International Banks, Berhan Bank, Cooperative Bank of Oromia, Debub Global Bank, Lion International Bank, Oromia Bank, Zemen Bank, Bunna International Bank, and Nib Bank.

3.4 Variables Description and Measurement

We summarized the variables and their measurements in Table 1. The table comprises the description and measurements of dependent,

Variables	Proxy	Definition	Measurement	Source
Dependent	Investment Growth (IG)	Investment assets include both tangible and intangible instruments that investors buy and sell for the purposes of generating additional income, on either a short- or long-term basis.	Total investment asset/total asset	(Tiurmauli et al. 2018; Kadim et al. 2020; Triani and Tarmidi 2020)
Independent	Political Stability (PS)	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism.	Estimate ranges from −2.5 (weak) to 2.5 (strong) governance performance	World Governance Indicators (WGI)
	Government Effectiveness (GE)	Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	Estimate ranges from −2.5 (weak) to 2.5 (strong) governance performance.	World Governance Indicators (WGI)
	Regulatory Quality (RQ)	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit	Estimate ranges from −2.5 (weak) to 2.5 (strong)	World Governance Indicators

	and promote private sector development.	governance performance	(WGI)
Rule of Law (RL)	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	Estimate ranges from −2.5 (weak) to 2.5 (strong) governance performances.	World Governance Indicators (WGI)
Control Corruption (CC)	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	Estimate ranges from −2.5 (weak) to 2.5 (strong) governances. performance	World Governance Indicators (WGI)
Voice and Accountability (VA)	Reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	Estimate ranges from −2.5 (weak) to 2.5 (strong) governance performances.	World Governance Indicators (WGI)
Corporate Income Tax (CIT)	Tax on the profits of a corporation	The natural logarithm of annual income tax expense	Karadeniz et al. (2009)
Real Gross Domestic Product (RGDP)	Is an inflation adjusted measures that reflects the value of all goods and services produced by an economy in a given year	Real GDP growth rate in percentage	Bokpin (2009)
Inflation (INF)	Increase in prices or the increase in the cost of living in a country	Annual rate of change on consumer price	Bokpin (2009)
Cash-flow (CF)	Operating income before tax	Operating income before tax/ total asset	(Chabachib et al. 2019)
Bank Size (BS)	The amount of total assets owned by a company.	The natural logarithm of the total assets	(Diantimala et al. 2021; Solikhah et al. 2022
Fixed Capital Intensity (FCI)	The amount of fixed or real capital in relation to total assets	Fixed asset/total asset	Rajan and Zingales (1995), Karadeniz et al. (2009).
Leverage (LEV)	Leverage is the use of debt to buy more assets and is employed to increase the return on equity.	Total liability/ Total equity	Alzubi and Bani-Hani (2021)

3.5 Model Specification

The basic concern of this study is to analyze institutional quality; macroeconomic and firm-specific determinates of investment decision-making of commercial banks in Ethiopia. Investment decision making is the function of institutional quality, macroeconomic, and bank-specific factors. Therefore, to analyze the effect of the above-mentioned factors on the investment decision making of Ethiopian commercial banks we develop the following panel regression model:

$$lG_{it} = \beta_0 + \beta_1(PS_{it}) + \beta_2(GE_{it}) + \beta_3(RQ_{it}) + \beta_4(RL_{it}) + \beta_5(CC_{it}) + \beta_6(VA_{it}) + \beta_7(RGDP_{it}) + \beta_8(INF_{it}) + \beta_9(CIT_{it}) + \beta_{10}(CF_{it}) + \beta_{11}(BS_{it}) + \beta_{12}(FCI_{it}) + \beta_{13}(LEV_{it}) + \mu_i + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots eq\,1$$

Where lG_{it} is investment growth of banks i at time t, PS_{it} is political stability, GE_{it} is government effectiveness, RQ_{it} is regulatory quality, RL_{it} is rule of law, CC_{it} control corruption, VA_{it} voice and accountability, $RGDP_{it}$ is real GDP, INF_{it} is inflation, CIT_{it} is corporate income tax of banks i at time t, CF_{it} is cash flow of banks i at time t, BS_{it} is bank size of banks at time t, FCI_{it} is fixed capital intensity of banks i at time t, LEV_{it} is leverage of banks i at time t, β_0 is intercept, $\beta_1 - \beta_{13}$ are coefficients, μ_i the unobserved individual effect, ε_{it} is error term.

3.6 Method of Data Analysis

To examine the effect of institutional quality and macroeconomic and firm-specific factors on the investment decision making of Ethiopian commercial banks, this study used panel data analysis. For this matter, the analysis starts by estimating the pooled OLS model and subsequently uses the Breusch-Pagan Lagrangian multiplier (LM) test to check the suitability of POLS for this model; otherwise, the model will be tested with random effects and subsequently diagnosed using the Hausman test for the correlated random effects, which provides hints on the suitability of either random or fixed effects for the model.

4. Results and Discussion

4.1 Descriptive Statistics

The descriptive statistics result shows that the average investment growth (dependent variable) of commercial banks is growing at an average rate of 20.9% every year. The standard deviation (9.4%), however, reveals that there is significant variation in investment growth among the commercial banks. The maximum and minimum investment have given during the study period were 55.7% (552 billion Ethiopian Birr) and 5.3% (7.8 billion Birr).

Table 2: Descriptive statistics for the variables

Variable	Obs=160	Mean	Std.Dev.	Min	Max
IG		.2094945	.0938924	.0526625	.5575712
PS		-1.654	.2606697	-2.07	-1.31
GE		-.61	.0693546	-.71	-.44
RQ		-1.007	.0775797	-1.14	-.9
RL		-.508	.082453	-.65	-.39
CC		-.443	.0555	-.56	-.36
VA		-1.213	.141727	-1.43	-1.04
RGDP		8.31	1.82199	5.3	10.4
INF		14.77	7.811883	7.4	34
CIT		8.145579	.6544024	4.477121	9.916454
CF		.0303492	.0121134	-.0375342	.0646173
BS		10.26827	.6138059	8.580423	12.06355
FCI		.0264611	.0162984	.0045282	.0861061
LEV		7.165104	3.775738	2.362	27.736

Source: STATA output, 2023

The six institutional quality measures exhibit negative values indicating that the institutional

quality of Ethiopia is weak. Nevertheless, the minimum and maximum values as well as the standard deviations reflect there is a difference between the institutional quality measures in Ethiopia. Regarding the macroeconomic variables, the average value of the real gross domestic product (GDP) is 0.0831%, which confirmed that on average the real gross domestic product growth rate was 8.31% with a minimum value of 0.053 (5.3%) and a maximum value of 0.104 (10.4%). Likewise, the average value of the inflation rate was 0.1477, which indicated that the general inflation rate of the country was 14.77% with a minimum value of 0.074 (7.4%) and a maximum value of 0.34 (34%) during the study period. The corporate income tax of sampled commercial banks, measured by the natural logarithm of total corporate income tax paid, ranges from a minimum value of 4.48(30,000 Ethiopian Birr) to a maximum value of 9.91 (8,250,000,000 Ethiopian Birr) with an average value of 8.145579 (139,090,000 Ethiopian Birr). The average value of cash flow is 3.03, which indicated that 3.03 birr before tax was generated from one birr investment on bank assets. The cash flow of banks ranges from −3.75 (−73.75 birr) of minimum value to 6.5 (6.5 birr) of maximum values with a standard deviation of 1.2. On top of that, the average value of firm size (bank size) measured by the natural logarithm of the total assets of commercial banks, ranges from a minimum value of 8.58(380 million Ethiopian Birr) to a maximum value of 12.06 (1.2 trillion Ethiopian Birr) with an average value of 10.27(18 billion Ethiopian Birr). However, the average value of fixed asset intensity is 0.026 (2.6%), which portrayed that on average from the total assets of the sampled Ethiopian Commercial Banks 2.6% are fixed asset which range from 0.45% to 8.6% with 16.3% deviation from the mean value. Furthermore, leverage (total debt to total equity) the mean value of banks was 7.165104 with the standard division 3.775738. This means Ethiopian commercial banks debt on average more than seven times greater than their total equity. The minimum debt to equity ratio is 2.362 times and the maximum is 27.736 times.

4.2 Diagnostic Test

Whenever panel data is used, it is very imperative to test the robustness of the estimation strategy before and after estimation. The study estimates the effect of institutional quality, macroeconomic and firm specific factors on the investments decision making of Ethiopian commercial banks using the random effect model, the fixed effect model, and pooled OLS as alternative estimation models. To find out whether Pooled OLS or REM would be more proper, the research performs the Breusch-Pagan Lagrange Multiplier (LM) test in which OLS is the null hypothesis or variances across firms is zero. The test result was shows that the Pooled OLS are not suitable in the model. To choose a better estimate between fixed effect and random effect model, the Hausman test was conducted, and it find that the random effect model is a worthier estimator indicating the difference in coefficient is not systematic.

Among the explanatory variables, it was found an inconstant variance of error term (heteroskedasticity problems) using Breusch-Pagan test. Our Shapiro- Wilk W test also shows there is an abnormal distribution in certain variables. To avoid the possibility of incorrect inferences due to these two potential problems, the structure of the variables that have normality problems were transformed into logarithms, and statistically clustered robust standard errors were used. In addition, the study checked the presence of a multicollinearity problem using Variance Inflation Factors (VIF), as suggested by Greene, (2008) and Gujarati (2004). Given that, the six institutional quality proxy's voice and accountability result in a multicollinearity problem. Run separate regressions introducing one institutional variable at a time as there might also be a multicollinearity problem (Alraheb et al., 2019). On top of that from the macroeconomic variables real gross domestic product also have multicollinearity problem. Tehulu, (2021), it is suggesting that the inclusion of institutional factors has absorbed the predictive power of GDP growth rate (catch-up phenomenon) due to the correlation between the level of economic development and institutional factors. Therefore, to avoid the multicollinearity problem the two variables are excluded from the regression. After the excluded the two variables (voice and accountability and real GDP) from the regression the mean VIF was 2.95. According to

various econometric literature studies such as that by Greene (2008), the correlation among variables is high if VIF is found to be greater than 5. Therefore, in our regression, there is a negligible linear relationship among the explanatory variables, justifying their inclusion in the alternative models. Details of the diagnostic test results and the regression outputs are available in the annex section.

4.3 Discussion

The results of the Hausman test showed that the random effect model was the most feasible.

Table 2 Regression results

VARIABLES	Model (1) Investment Growth Robust (POLS)	Model (2) Investment Growth Robust (FEM)	Model (3) Investment Growth Robust (REM)
Political Stability	0.096***	0.053*	0.094***
	(0.033)	(0.028)	(0.015)
Government Effectiveness	-0.145*	-0.207***	-0.156***
	(0.080)	(0.034)	(0.042)
Regulatory Quality	-0.338***	-0.051	-0.304***
	(0.094)	(0.128)	(0.094)
Rule of Law	0.108	0.148***	0.106**
	(0.088)	(0.038)	(0.047)
Control Corruption	-0.044	0.061	-0.020
	(0.115)	(0.070)	(0.041)
Inflation	-0.003**	-0.002**	-0.003***
	(0.001)	(0.001)	(0.001)
Corporate Income Tax	0.002	-0.008	-0.005
	(0.017)	(0.014)	(0.014)
Cash Flow	1.080**	0.384	0.307
	(0.536)	(0.588)	(0.592)
Bank Size	0.112***	-0.000	0.095*
	(0.033)	(0.041)	(0.049)
Fixed Capital Intensity	-0.619**	-0.508	-0.239
	(0.277)	(0.485)	(0.425)
Leverage	0.001	-0.003	-0.002
	(0.003)	(0.002)	(0.002)
Constant	-1.164***	0.344	-0.868*
	(0.285)	(0.515)	(0.503)
Observations	160	160	160
R-squared	0.634	0.630	0.634
Number of CrossID		16	16

Note: *** p<0.01, ** p<0.05, * p<0.1; standard errors in parentheses

Source: STATA output, 2023

The findings demonstrate that a key element influencing commercial banks' increases in investment is institutional quality. The new and interesting results that show a positive and significant effect of political stability and the absence of violence on the growth of commercial banks' investments, with a significance of 1%. These results are consistent with Huang's (2010) finding that healthy political systems tend to provide investors with more confidence to participate in long-term economic endeavors, which in turn encourages the growth of the financial sector. Based on these results, this study fails to reject the hypothesis, namely that political stability has a positive effect on bank investment decisions. Political stability and

investment growth are positively correlated, which suggests that commercial banks operating in Ethiopia that enjoy more political stability also provide more investment opportunities.

Activities of banks, as economic entities, need an array of supportive institutional factors some of which are technical such as telecommunications network and others are of political and legal nature. Political stability is a key ingredient for a bank to enable it to plan. A stable political environment is imperative in determining whether a bank will undertake a major investment project to at least maintain (let alone increase) its growth trend in the future. The real-options approach to irreversible investments is often regarded as the most viable avenue to solve the issue of the investment-uncertainty link among the various competing theoretical models (Baum et al., 2008). In contrast, with political instability, however, this would be difficult as the bank's decisions makers will be, rightfully, unwilling to engage in a capital investment in an environment characterized by inconsistent or unpredictable political structure. Therefore, political instability and undemocratic governments erode confidence and inhibit bank investment (Hasan et al., 2009).

The quality of policies created and carried out by the government, as well as the legitimacy of that commitment is reflected in the effectiveness of that government. Furthermore, the regulatory quality indicates how well the government can create and carry out sensible laws and policies that support and encourage the growth of the private sector. Since the results of McKinney and Moore's (2008) study are in contradiction with the regression result of this study, which indicates that government effectiveness and regulatory quality are statistically significant and positively impact the growth of commercial banks' investments. Based on these results, the study rejects the hypothesis that regulatory quality and government effectiveness influence bank investment decisions positively. This outcome is due to Ethiopian commercial banks operating under National Bank supervision and control.

Licensing and supervision of banking business limitations of investment of banks (2nd replacement) directive No. SBB/65/2017 banking business defined as:

***"Banking business** means the business of receiving or accepting money or its equivalent on deposit and lending out this money in order to earn a profit; transfer funds; the buying and selling of gold and silver bullion and foreign exchange; discounting and negotiation of promissory notes, drafts, bills of exchange and other evidence of debt; and any other activity recognized as customary banking business as stipulated in article 2(2) of Banking Business Proclamation No. 592/2008."*

Based on the banking business definition above commercial banks investment and financing of banks limited to 1) No bank shall directly engage in insurance business. However, a bank may hold equity shares not exceeding 5% of an insurer's subscribed capital in a single insurance company; 2) No bank shall engage directly in non-banking business or in businesses other than those indicated in the above definition of banking business; 3) No bank shall invest more than 10% of its net worth in real estate acquisition and development, other than for own business premises, without prior approval of the National Bank.

Therefore, this investment restrictions set by NBE may result government effectiveness and regulatory quality negatively affected the investment asset growth of Ethiopian commercial banks. In contrast, the government's ability to implement sound regulations and policies that promote banking sector development is an essential stimulus for the banking sector to continue their investments.

The results reveal that the relationship between investment growth and rule of law is positive statistically significant. The study establishes that strong rule of law has a vital role in the investment growth of commercial banks. This finding is in line with the findings of Karikari et al. (2021) and Awdeh and El-Moussawi (2021) that document a positive association of the rule of law with bank investment decision.

As to control of corruption and investment growth nexus, the result shows that control corruption has negative but not statistically significant effect on investment growth of Ethiopian commercial banks. The negative sign is consistent with the grabbing hand argument which refers; corruption enhances the cost of production, which eliminates investment (Sadhon Saha, Md. et al., 2022). On the other

hand, Mendoza et al. (2015) present evidence that, in certain situations, corruption helps developing market businesses function better by allowing them to avoid excessive bureaucracy. Therefore, by "greasing the wheels" of the growth of investment assets, corruption may benefit bank development in the context of emerging markets.

In terms of the macroeconomic variable, a high rate of inflation is a sign that money is losing value. It has an impact on economic expansion, which subsequently has an impact on company operations in all nations (Ayyoub, Chaudhry, & Farooq, 2011). As a result, the study's findings demonstrate that the rate of inflation significantly and negatively affects the growth of commercial banks' investments. The outcome aligns with Fischer's (2013) research, which proposed an inverse relationship between corporate investment and the inflation rate because of significant risks and very uncertain economic conditions. Furthermore, Omay and Kan (2010) emphasized how a high rate of inflation loaded a lot of economic pressure on businesses, forcing them to demand their investment back. Furthermore, additional empirical studies (Olanipekun, 2013; Onwe & Olarenwaju, 2014; Valadkhani, 2009) also point to the inverse link. As a result, the hypothesis that inflation significantly hinders the expansion of commercial banks' investments is accepted. However corporate income tax the model result indicated that corporate income tax has a negative effect on the investment growth of commercial banks, but it is not statistically significant. The negative coefficient is consistent with the finding of Hall & Jorgensen (1967), which is that corporate taxation can distort investment plans by reducing the after-tax returns to new investments. Moreover, corporate taxes could also impact investment by reducing the amount of cash flow a firm has available to invest (Asingwa E., 2012). De Mooij et al. (2001) and Meng (2010) also found a negative relationship between corporate taxation and the investment growth of banks.

The bank-specific variables shown in Table 2 and the study's model result showed that cash flow has a positive and statistically insignificant effect on the growth of commercial banks' investment assets. The positive sign indicated that businesses may use their cash inflows for investment activities if they have enough of them (Danish & Ahmed, 2022). Furthermore, theoretically, it is anticipated that bank capital flow will positively influence the growth of commercial banks' investment portfolios. The results of this investigation further demonstrate that cash flow has a positive coefficient, in line with Lewellen J. L. (2016), but that it has no statistically significant effect on the growth of commercial banks' investment.

According to the model's results, Ethiopian commercial banks' investment growth is positively affected by their size, and if not at 5%, at 10%, it is statistically significant. According to Li et al. (2012), firm size significantly positively affects banks' increases in investment. The rationale is that big businesses can invest more in capital projects than small businesses because they can obtain more funding and have more internal resources (Akhtar, 2018). In business investment, the size effect has statistical and economic significance. Gala & Julio (2016), state that the findings show a clear correlation between corporate investment size and size. Consequently, the research study's findings are in line with the empirical data showing that firm size significantly positively affects the growth of commercial banks' investment. Therefore, it is not possible to reject the hypothesis that business size positively affects investment growth. Furthermore, the study's findings indicated that, while not statistically significant, fixed capital intensity had a negative effect on Ethiopian commercial banks' ability to grow their investments. Expenses associated with large, fixed capital expenditures may limit future investment (Saquido, 2003). A company's increase in fixed capital indicates that there is a high level of market demand for the product, prompting the investment in fixed assets to meet the demands (Hijazi and Tariq et al., 2006).

In conclusion, the study result shows that leverage has negative effect on the investment growth of commercial banks but not statistically significant. A company that has high leverage means that the company uses high debt, thereby reducing investment decisions. This is due to the large amount of debt the company has, so it will reduce cash flow because of the interest costs paid (Sheikh et al., 2022).

5. Conclusion, Contribution and Limitation of the Study

5.1 Conclusion

The random effect model shows that country institutional quality, macroeconomic and firm-specific factors have an effect on investment decision making of Ethiopian commercial banks. Commercial bank investment decisions are strongly influenced by the country's institutional quality. Political stability and rule of law has positive effect on the investment growth of commercial banks. In light with the positive relationship this research study suggests that commercial banks' operating in Ethiopia with strong political stability and rule of law enhances the investment activities of commercial bank. This implies that commercial banks' operations in Ethiopia, considering the country's political stability and rule of law, are highly relevant to their investment decisions. In contrast government effectiveness and regulatory quality has negatively affected the investment growth of commercial banks. This indicated that regulatory and supervisory authorities monitor commercial banks in a weaker institutional environment. Given the vital role of government effectiveness and regulatory quality on the investment decisions of commercial banks this study advice the government to strive for strong government effectiveness and regulatory quality to enhance the investment activities of commercial banks. Hence, regulatory bodies and bank management need to consider the role of institutional quality in the investment growth of commercial banks to deal with a possible investment limitation. Apart from institutional quality variables macroeconomic and firm specific variables are also important factors of investment decision of commercial banks. Inflation which is one of the most critical macroeconomic variables also affects the investment decision of commercial banks. In conclusion, the firm specific variables fixed capital intensity has significant effect on the investment decision of commercial banks.

5.2 Contribution of the Study

This study will contribute to the policy by providing insights regarding institutional quality and macroeconomic policy and its effect on investments decision of Ethiopian commercial banks. More importantly, managerial decisions have an effect on both on short-run and long-run investment decision of commercial banks in Ethiopia. Hence, managers of commercial banks will focus on more important investment that can enhance banks' operation. The study further will contribute to the literature or knowledge by providing theoretical applications regarding institutional quality, macroeconomic and firm-specific factors, and its effect on the investments decision of commercial banks in developing nations. Moreover, the study provides a theoretical perspective on commercial banks' investment in developing countries which is exposed to different national government regulation.

5.3 Limitation and Future Research Direction

The following are the limitations associated to this study. First, this study is limited to the effects of institutional quality, macroeconomic and firm- specific factors on investment decisions of with the special emphasis on Ethiopian commercial banks for the period 2013 to 2022. Second, this study considers only the effects of overall institutional quality, macroeconomic and firm specific factors on investment decision of commercial banks. However, institutional quality, macroeconomic and firm- specific factors might have a time horizon implication on the investment decisions. For example, institutional quality, macroeconomic and firm specific factors might have different effect on the investment decision to the short-run and long run. Third, the sample of this study comprises both private and public commercial banks in Ethiopia and didn't run the categorical analysis. However, the investment nature of private commercial banks might be different from public commercial banks. The fourth the focus of the study was on quantitative data and qualitative measures that may influence investment decision of Ethiopian commercial banks were not treated and may need further investigation.

Therefore, future researchers should:

A. Consider other Ethiopian financial institutions such insurance companies and microfinance institutions so that it will bring a full picture of the effects of institutional quality, macroeconomic and firm- specific factors on investment decision on financial sectors in Ethiopia.
B. Examine the effects of institutional quality, macroeconomic and firm- specific

factors on investment decision of commercial banks in the short run and long run.

C. Split the sample as private and public commercial banks and run categorical analysis that can clearly shows the effects of institutional quality, macroeconomic and firm -specific factors on investment decision of public and private commercial banks' in Ethiopia.
D. Consider both quantitative and qualitative measures to have comprehensive information.

Data Availability Statement

1. Institutional quality data is available under the World Bank Database- https://data.worldbank.org/
2. Macroeconomic data is available on the Ethiopian Ministry of Finance website - https://www.mofed.gov.et/
3. Firm-specific data is available on the Ethiopian national bank website (https://nbe.gov.et/) and the website of each sampled commercial bank's website

Authors Contributions

Sofoniyas Mekonnen Fekadu: Conceptualization, methodology, interpretation of data, analysis, Writing original draft: **Deresse Mersha Lakew**; Conceptualization, Supervision: **Lemessa Bayissa Gobena**; Methodology, Supervision

Declaration of Competing Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Annex

A. Normality Test:

```
. swilk residual

                    Shapiro-Wilk W test for normal data

    Variable |   Obs        W          V        z       Prob>z
-------------+--------------------------------------------------
    residual |   160    0.98975    1.261    0.528    0.29884
```

B. Multicollinearity Test

VIF before removing RGDP and VA (Voice and Accountability) from the regression

Variable	VIF	1/VIF
RGDP	27.10	0.036904
VA	14.89	0.067171
RQ	10.54	0.094872
INF	10.35	0.096606
PS	9.76	0.102419
BS	7.42	0.134719
CC	5.03	0.198643
CIT	4.18	0.238973
RL	3.48	0.287580
LEV	2.88	0.346971
GEF	2.72	0.367688
FCI	1.21	0.829476
CF	1.11	0.903674
Mean VIF	7.74	

VIF after removing RGDP and VA (Voice and Accountability) from the regression

Variable	VIF	1/VIF
BS	7.34	0.136233
INF	4.85	0.206177
CIT	4.14	0.241809
PS	2.92	0.343027
LEV	2.86	0.349186
RQ	2.61	0.383061
CC	1.97	0.508463
RL	1.86	0.536262
GEF	1.59	0.627878
FCI	1.20	0.829924
CF	1.10	0.911088
Mean VIF	2.95	

C. Heteroskedasticity test

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of IG

        chi2(1)      =    40.33
        Prob > chi2  =   0.0000
```

D. Model Specification Tests:

1) POLS vs REM

```
Breusch and Pagan Lagrangian multiplier test for random effects

        IG[CrossID,t] = Xb + u[CrossID] + e[CrossID,t]

        Estimated results:
                         |       Var      sd = sqrt(Var)
                ---------+------------------------------
                      IG |    .0088158        .0938924
                       e |    .0012937        .0359687
                       u |    .0017054        .0412966

        Test:   Var(u) = 0
                                  chibar2(01) =   186.39
                               Prob > chibar2 =   0.0000
```

2) FEM vs REM

```
. hausman fe
```

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
PS	.0527511	.0943745	-.0416235	.0097091
GEF	-.2074071	-.1557182	-.0516888	.
RQ	-.0505058	-.3035321	.2530263	.067283
RL	.147761	.1062129	.0415481	.
CC	.061239	-.0200455	.0812845	.
INF	-.0021635	-.0030742	.0009107	.
CIT	-.0079364	-.0053543	-.002582	.
CF	.383812	.3067534	.0770586	.
BS	-.0002592	.0954966	-.0957558	.0260769
FCI	-.5077914	-.2393759	-.2684155	.072211
LEV	-.0029372	-.0022812	-.000656	.

```
                    b = consistent under Ho and Ha; obtained from xtreg
         B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                         =        9.05
              Prob>chi2 =      0.6175
              (V_b-V_B is not positive definite)
```

Robust Regression Result

A. POLS robust result

```
. reg IG PS GEF RQ RL CC INF CIT CF BS FCI LEV, robust

Linear regression                               Number of obs =     160
                                                F( 11,   148) =   22.99
                                                Prob > F      =  0.0000
                                                R-squared     =  0.6342
                                                Root MSE      =  .05886
```

IG	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
PS	.0964246	.0330037	2.92	0.004	.0312053	.161644
GEF	-.1451374	.0795153	-1.83	0.070	-.3022694	.0119945
RQ	-.337977	.0942169	-3.59	0.000	-.5241612	-.1517928
RL	.1083372	.0883141	1.23	0.222	-.0661822	.2828567
CC	-.0435084	.1150948	-0.38	0.706	-.2709498	.1839331
INF	-.0033813	.0014729	-2.30	0.023	-.006292	-.0004706
CIT	.0017847	.0166568	0.11	0.915	-.0311311	.0347005
CF	1.079592	.5360104	2.01	0.046	.0203696	2.138814
BS	.1121684	.0325019	3.45	0.001	.0479407	.1763962
FCI	-.6191955	.2771792	-2.23	0.027	-1.166936	-.0714554
LEV	.0009557	.0031539	0.30	0.762	-.0052768	.0071882
_cons	-1.163735	.2853051	-4.08	0.000	-1.727532	-.5999367

.

B. FEM robust result

```
. xtreg IG PS GEF RQ RL CC INF CIT CF BS FCI LEV, fe robust

Fixed-effects (within) regression               Number of obs      =       160
Group variable: CrossID                         Number of groups   =        16

R-sq:  within  = 0.6299                         Obs per group: min =        10
       between = 0.4614                                        avg =      10.0
       overall = 0.0675                                        max =        10

                                                F(11,15)           =     59.13
corr(u_i, Xb)  = -0.2390                        Prob > F           =    0.0000

                                    (Std. Err. adjusted for 16 clusters in CrossID)
```

IG	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
PS	.0527511	.0280404	1.88	0.079	-.0070156	.1125178
GEF	-.2074071	.0341952	-6.07	0.000	-.2802924	-.1345217
RQ	-.0505058	.1283921	-0.39	0.700	-.324167	.2231555
RL	.147761	.0383785	3.85	0.002	.0659592	.2295628
CC	.061239	.0701278	0.87	0.396	-.0882349	.2107129
INF	-.0021635	.0007779	-2.78	0.014	-.0038216	-.0005053
CIT	-.0079364	.014236	-0.56	0.585	-.0382797	.022407
CF	.383812	.5882282	0.65	0.524	-.8699666	1.637591
BS	-.0002592	.0405282	-0.01	0.995	-.086643	.0861246
FCI	-.5077914	.4846899	-1.05	0.311	-1.540883	.5253006
LEV	-.0029372	.0018851	-1.56	0.140	-.0069552	.0010808
_cons	.3436543	.5151344	0.67	0.515	-.7543287	1.441637
sigma_u	.08958443					
sigma_e	.03596868					
rho	.8611729	(fraction of variance due to u_i)				

.

C. REM robust result

```
. xtreg IG PS GEF RQ RL CC INF CIT CF BS FCI LEV, re robust

Random-effects GLS regression                   Number of obs      =       160
Group variable: CrossID                         Number of groups   =        16

R-sq:  within  = 0.6037                         Obs per group: min =        10
       between = 0.6347                                        avg =      10.0
       overall = 0.5870                                        max =        10

                                                Wald chi2(11)      =    430.82
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

                                (Std. Err. adjusted for 16 clusters in CrossID)
------------------------------------------------------------------------------
             |               Robust
          IG |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          PS |   .0943745   .0152289     6.20   0.000     .0645264    .1242227
         GEF |  -.1557182   .0419294    -3.71   0.000    -.2378984   -.0735381
          RQ |  -.3035321   .0943247    -3.22   0.001    -.4884051   -.1186591
          RL |   .1062129    .047463     2.24   0.025     .0131872    .1992385
          CC |  -.0200455   .0409449    -0.49   0.624    -.1002959     .060205
         INF |  -.0030742   .0011541    -2.66   0.008    -.0053362   -.0008122
         CIT |  -.0053543   .0138213    -0.39   0.698    -.0324435    .0217348
          CF |   .3067534   .5916098     0.52   0.604    -.8527804    1.466287
          BS |   .0954966   .0492052     1.94   0.052    -.0009438     .191937
         FCI |  -.2393759   .4253501    -0.56   0.574    -1.073047    .5942949
         LEV |  -.0022812   .0015105    -1.51   0.131    -.0052418    .0006794
       _cons |  -.8681752    .503123    -1.73   0.084    -1.854278    .1179277
-------------+----------------------------------------------------------------
     sigma_u |  .04129664
     sigma_e |  .03596868
         rho |  .56863033   (fraction of variance due to u_i)
------------------------------------------------------------------------------

.
```