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**Which Factors Are More Important In  
Emerging Economies: External or Internal?**

Master's thesis

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## **Declaration**

1. I hereby declare that I have compiled this thesis using the listed literature and resources only.
2. I hereby declare that my thesis has not been used to gain any other academic title.
3. I fully agree to my work being used for study and scientific purposes.

In Prague on  
6<sup>th</sup> July 2020

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## References

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## **Abstract**

Employing Vector Error Correction Model (VECM), this dissertation aims to explore the principal influential factors of economic growth from external and internal perspectives. After extensive analysis and previous research, trade openness is the external factor considered, while financial markets and institutions are the internal ones. Based on the dataset of four typical fast-growing emerging economies——China, India, South Africa and Russian Federation, this study found that there is a significant long-term equilibrium among GDP growth, trade openness, financial markets and institutions in China, and bidirectional causality can be observed between trade openness and GDP growth. Regarding the remaining economies, there are two sets of long-term relationships among these variables, where internal factors concerning financial development are more crucial in these countries, which also significantly affect the trade volumes in the long run. Results from this research indicate that the dominant growth-enhancing factors are closely related with a country's policy, history, and the most importantly, the focus of its development strategy.

## **Keywords**

Economic Growth, Trade Openness, Financial Markets and Institutions, VECM, Emerging Economies

## **Abstrakt**

Tato disertace se zaměřuje na zkoumání hlavních vlivných faktorů hospodářského růstu z vnějších a vnitřních perspektiv. Po rozsáhlé analýze a předchozím výzkumu je otevřenost obchodu považován za externí faktor, zatímco vnitřní jsou finanční trhy a instituce. Na základě souboru údajů čtyř typických rychle rostoucích rozvíjejících se ekonomik—Čína, Indie, Jižní Afrika a Ruská federace tato studie zjistila, že existuje významná dlouhodobá rovnováha mezi růstem HDP, otevřeností obchodu, finančními trhy a institucemi v Číně, a může být pozorována obousměrná příčinná souvislost mezi otevřeností obchodu a růstem HDP. Pro zbývající země existují dva soubory dlouhodobých vztahů mezi těmito proměnnými, kde jsou vnitřní faktory týkající se finančního rozvoje v těchto ekonomikách zásadnější, což také významně ovlivňuje objem obchodu v dlouhodobém výhledu. Výsledky tohoto výzkumu ukazují, že dominantní růstové faktory jsou úzce spjaty s politikou, historií země, a co je nejdůležitější, s ohniskem její rozvojové strategie.

## **Klíčová slova**

Hospodářský Růst, Otevřenost Obchodu, Finanční Trhy a Instituce, VECM, Vznikající Ekonomiky

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## Chapter I Introduction

Amid extensive trade tensions and protracted policy uncertainty, the global economy is experiencing unprecedented deterioration since the financial crisis of 2008. Rising tariffs and the trade war mainly between the United States and China have fueled the turbulence to global supply chains and trade growth, with significant turmoil in social and economic instability. This ongoing slump threatens to impede the movement to poverty eradication, better living standards and the more job creation (UN, 2020). Noticeably, the progress towards eliminating poverty and inequality issues have been hindered, with the persisting high poverty level in many countries, where people cannot even afford the expenditure at the extreme poverty line (\$1.90 per day). Moreover, financial development is also plagued by the slowdown in the world economy, together with some financial fragilities, such as elevated debt levels and long-lasting loose monetary conditions, which imply the potential risk of financial stability and weakening economies' resilience to external shocks. Against this backdrop, the task of exploring the efficient factors for economic recovery has become the priority, and policymakers and economists are becoming more focused on the economic structure that are able to support long-term growth.

Economic growth has long been heated discussed, emerging a substantial body of paramount and influential economic theories, among which the classical economics can be considered a cornerstone of opinions on economics of development. This theory is pioneered by Adam Smith, Jean-Baptiste Say, David Ricardo and Thomas Robert Malthus in 18<sup>th</sup> century, and these economists proposed the concept of market economies, pointing out that an economy should be a self-regulating system which is mainly propelled by the invisible hand——market, and the freedom of the market is advocated to serve the common interest. Smith further stresses the significance of competition and specifies the harms of monopoly, for providing the evidence of such assertion, classical economists point out the benefits brought by free trade, contributing to many widely-spread theories which are still regarded as essential concepts nowadays, such as absolute and comparative advantages (Smith 1776; Pearce, 1992; Baumol, 1970; O'Sullivan and Sheffrin, 2003). In the late 19<sup>th</sup>- and early 20<sup>th</sup>- century, neoclassical economics appeared and gradually obtained the widespread acceptance. The economists of this school focus on supply and demand channel to explain the variation in consumption of goods and services, outputs and pricing in the market, and the synthesis of neoclassical and Keynesian economics<sup>1</sup> has dominated the mainstream economics (Aspromourgos, 1986; Clark, 1998). The Solow-Swan model is an important model explaining the long-term growth set within the system of neoclassical economics, which considers capital accumulation, labor growth and the improvement in productivity or technological progress as the main growth-enhancing factors, while Keynesian economics address short-run fluctuations, emphasizing that the increase in aggregate demand can contribute to higher output, lower unemployment as well as more inflationary pressure on the price level. According to the Solow-Swan model, if a country's productivity is improved by advancing its technology level, the productivity of labour will also rise at a corresponding rate since the economy is in the steady state (the equilibrium when there is a proportionate increase in labor and capital in an economy). Therefore, this growth model implies that economic growth can be contributed by technological advancement (Solow, 1956; Swan, 1956; Acemoglu, 2009). Although the Solow-Swan model initiates the framework of

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<sup>1</sup> Keynesian economics cover a wide range of macroeconomics theories with regard to how economic output is closely related to aggregate demand in the short term, and especially during recession periods. According to Keynesian, the total spending in an economy is not only decided by its productivity capacity, instead, it can be influenced by various factors, leading to the erratic trend and affecting inflation, production and employment (Humphrey, 1981; Fletcher, 1989).

capital, labor and production, some limitations have been criticized. For example, technological progress is the only factor driving growth of per capita output in the steady state and it is exogenous, which cannot be determined by the model.

Different from Solow and Swan's exogenous model <sup>2</sup>(since it mainly focuses on exogenous economic factors), some economists raised endogenous growth theory. This theory holds that human capital, the skill, knowledge and the resulted spillover effects are more crucial in encouraging economic growth, this assumption is favored by a large body of theorists, such as Hirofumi Uzawa (1965), Robert Lucas (1988) and Sergio Rebelo (1991). Various economic models have been developed based on endogenous growth theory, the common feature of which is the existence of certain mechanism that eliminates the diminishing marginal productivity of capital endowment. In particular, human capital is one of the possible channels and probably the most popular one. Among these models, the AK model, the simplest but typical one which represents endogenous growth theory, is based on a linear relationship where the total production is a linear function of capital, and this model also proves the weakness of neoclassical exogenous growth models by excluding the property of diminishing returns to capital (the fundamental reason for the supporters of endogenous growth theory to criticize the Solow and Swan's model) in its framework.

In addition to above long-established theories, other relatively more intuitive approaches have also been widely-used for evaluating and improving economic development. During the periods of economic downturn or stagnation, governments are often under pressure to legislate new policies to mitigate the recession, thus, the Business Cycle can be valued for this consideration. This is the economic cycle about the long-term trend of GDP, with upward and downward fluctuations, also known as the Trade Cycle. There are four phases in this cycle: expansion, peak, contraction and trough. Although no uniform or anticipated periodicity exists in these four stages (leading to an increasing number of economists preferring the name of "economic fluctuations"), the Business Cycle is often considered as one of the factors that governing bodies should take into account when adjusting fiscal and monetary policies. For example, a state's central bank often applies expansionary monetary policy when the country is experiencing the contraction or trough, related measures would be applied such as lowering the interest rate. Instead, contractionary monetary policy would be adopted during an expansion. Moreover, economists and policymakers often study other countries' Business Cycles to acquire some insights about achieving or keeping economic expansion, as well as the approaches to passing recessions quickly (See Wells, 1890; Kitchin, 1923; Madhani, 2010).

In recent years, the long-lasting economic expansion of emerging economies has attracted many scholars' attention, especially the favorable and continuing growth in emerging Asia<sup>3</sup>. This group has displayed a marked and stable climbing trend in its economic output within this decade, with recorded GDP growth rate of 6.6% in 2018 and 6.3% in 2019, respectively (OECD,

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<sup>2</sup> The Harrod-Domar model is the precursor to the exogenous theory, leading to the appearance of the Solow-Swan model. This model developed three kinds of growth, which are actual growth, warranted growth and natural rate of growth respectively, and it suggests that no natural reason can realize the balanced growth in an economy; namely, there is an inherently instability in every economy (Harrod, 1939; Domar, 1946). However, this model has attracted widespread criticism in modern economics, such as the exaggeration of instability and unrealistic assumptions.

<sup>3</sup> Emerging Asia refers to Southeast Asian countries, India and the People's Republic of China ('China' hereafter).

2020). In spite of a slight decrease, the expected growth rate of emerging Asian markets is still much higher than the world average level in the following years, at approximately 6.1% on yearly average from 2019 to 2023. It is worth mentioning that ASEAN (Association of Southeast Asian Nations) is the fourth-largest exporting region in the world, which constitutes only 3.3% of global GDP, but accounts for more than 7% of total world's exports (OECD, 2018a). Furthermore, despite suffering the global recession, East Asia keeps the world's fastest growth rate and contributes the most to aggregate global output (UN, 2020). Fostered by the expansion of technological progress and the application of new business models, in particular, e-commerce, this region has become one of the forerunners of the digital economy in global markets. As one of the fastest accelerating emerging economies, China's performance has been striking in recent years, no matter the high growth rate or the quick expansion of its international markets. Additionally, technological progress in China is noticeable, presented by widely-used digital business platforms and the adoption of 5G networks (the fifth generation wireless communications technologies). Currently, China has not only become one of the principal investment receiving countries, but also has been considered a key global investor, with 30 times increase in its Outward Foreign Direct Investment (OFDI) compared with its 2000 level (UNCTAD, 2018). Out of the wonder of these countries' quick development as well as the imminent threat of the deceleration in global growth, disclosing their driving forces seems to be necessary at current key point.

Therefore, this dissertation aims to investigate the dominant factors which can significantly affect an economy's growth based on the data of four emerging markets: China, India, South Africa and Russian Federation. The reason for choosing them as the observed group is because they all top the list of fastest growing emerging economies, which all show an obvious upward growing trend. Apart from this, these four countries have their own diverse and typical properties. Specifically, China, a country which developed from a financially lag-behind (a traditional centrally planned economy) to the world's second-largest economy (ranked by nominal GDP), its unusual growth track has attracted much attention, and it is favorable to investigate its economic driving forces especially for those populous countries, since they can gain some experience on exploiting the capital endowment, when considering the fact that China has the largest population. India, although it is also a highly populous country (second largest), its development strategies are distinctly diverse from China with more focus on the financial sector, telecommunication (the world's fastest-growing country in this industry), automotive (the world's second-fastest growing country in this industry) and pharmaceutical industries, where India has achieved significant progress. Another more apparent disparity lies in their political systems. India is the world's largest parliamentary democracy, while the Chinese Communist Party attempts to dominate the economy. Investigating these two both successful but contrasting large economies helps shed more light on political economy. South Africa, the southernmost country of the Eastern Hemisphere, is a mixed economy<sup>4</sup> covering a wide range of languages (with 11 official languages), cultures and religions. Contrary to most of the poor countries, South Africa's economy is dominated by formal sectors<sup>5</sup>, with less than 15% of employment are in the grey sectors. Utilizing the diversified economy and abundant natural resources, South Africa has been regarded as the most attractive investment destination

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<sup>4</sup> A mixed economy is usually interpreted as a country with a combining economic system, where the elements of planned economies, market economies, free economies with state interventionism or private sectors with public enterprises work together.

<sup>5</sup> Formal sectors (or formal economy) are defined as economic activities which are monitored by the official departments and operating within legal framework, where generated income should be taxed. The opposite of a formal sector is an informal economy, also known as grey economy, which is neither regulated nor taxed by the government.

country in Africa, and it has shown positive resilience to protracted stagnation, during which it still experiences stable growth. As the world's largest country by area, located both in Europe and Asia, Russian Federation, is a transition economy which combines markets with a significant role of politically-connected companies. Due to its changeable political and economic environment in addition to the country's structural problems, booms and plunges have constantly appeared in Russian economy in the past two decades. In view of this, it is beneficial to probe Russian economy for the purpose of avoiding economic instability and pursuing economic upsurge. As a consequence, these four countries which possess the mutual feature as well as respective attributes can be considered as ideal research subjects.

Therefore, considering this group's well-behaved economic performance in the context of global slowdown, based on the data of these four countries, our study aims to uncover a country's dominant growth-enhancing factors both from the short term and long term. The framework of this research is designed to start from analyzing a large range of potential factors which are likely to influence economic growth, from external and internal perspectives. After analysis, the research will mainly focus on trade openness, the development of financial markets and institutions, and further utilize Vector Error Correction Model (VECM) and Granger causality test to estimate their short- and long-run effects on GDP per capita growth. VECM, the primary empirical technique of this paper, is a well-functional econometric approach to investigate long-period equilibrium relationships, which efficiently avoids the weakness of standard regression models' spurious regression problems and Engle-Granger 2-step method's limitations, such as restricted cointegration analysis. In addition, VECM has been developed into many different frameworks and has been proved to be highly useful in exploring various economic and social issues, see Park and Phillips (1988; 1989); Stock (1987); Ahn and Reinsel (1990); Maddala and Kim (1998); Watson (1994); Gonzalo (1994) and Hubrich, Lütkepohl, and Saikkonen (2001).

The findings from VECM show that the effects of financial development is more significant in all observed countries in the long run except China where trade openness plays a more significant role in its economic growth. In the case of India, South Africa and Russian Federation, the development of financial markets are proved to be more powerful in affecting the country's output compared with the effects brought by financial institutions, and these effects are even less significant in South Africa and Russian Federation. Moreover, not only to GDP growth rate, but also to trade volumes where financial development can make a difference, and this finance-trade link (no matter from financial institutions or markets channels) are highly significant in these three countries except the impact from financial institutions in Russian Federation. As for the long-term equilibrium in China, different from other countries, there is only one cointegrating relationship can be detected, with all explanatory variables included. Apart from the principal economic effect of international trade, the development of both financial markets and institutions can make contributions to China's economy, although the response to the change in the former is more noticeable than that in the latter. In terms of short-run relationships, however, almost all variables are much less significant than in long-run relationships in all countries. Regarding the results of Granger causality test, the results show that there is a bidirectional causality between GDP growth and trade openness in China and South Africa, while an unidirectional causality exists in Russian Federation, from trade openness to GDP growth. Consistent with the discovery in VECM approach, the relationships between financial markets and economic growth are more observable than the links between financial institutions and the economic indicator.

This dissertation, therefore, contributes to the literature in the following aspects. Firstly, it provides evidence on the dominant driving forces of a country's economic growth by comparing various external and internal factors, which is of great realistic meaning for other economies' reference to handle current recession. Secondly, considering the long-term development objective of most countries, the results of this study led by VECM framework, which is useful to estimate not only short-run but also long-run relationships, would be more applicable and favorable to achieve long-term economic boom. Thirdly, the exploited empirical process, including VECM technique, Granger causality test as well as other post estimation tests, has been well-developed and efficient in exploring long-term equilibrium, and it has also been applied into voluminous research, thus, the results based on this empirical approach is convincing and valid. Furthermore, the selected observed countries possess the mutual characteristic—they are all one of the fastest growing emerging economies, as well as the disparate but typical features concerning the economic policy, historical context, and development strategy, leading to more constructive and helpful results for countries with similar background. In addition, few existing research compare the economic factors divided into external and internal two groups, therefore, this study from this perspective may shed some light on the consideration about the focus of a country's development.

The remainder of this dissertation has been structured in the following manner. Chapter II presents an extensive theoretical analysis regarding the potential explanatory factors of economic growth, from external and internal perspectives, in addition to relevant background information about global economy and emerging markets. This chapter lays a sound foundation for the following empirical research, specified in Chapter III, where VECM approach, Granger causality test and other post-estimation tests will be used to inspect the dominant growth-enhancing causes, together with corresponding explanations. It will then go on to Chapter IV, where detailed discussion and analysis related to every single country's policies and history will be illustrated based on the findings in Chapter III. Finally, this paper will be concluded by the main results of this study and some implications for future research.

# Chapter II Background Information and Literature Review

## 2.1 Background Information

### 2.1.1 Global Economy

The driving powers of economic growth have long been the focus of economists and policy makers, especially in such a dynamic economic and social environment<sup>6</sup>. Amid protracted trade tensions and perplexing policy uncertainties, global economy, out of the blue, is experiencing a wide-spread deterioration, accompanied with the growth rate of world GDP dropping to 2.3% in 2019—the lowest recorded figure since the financial crisis of 2008-09. Approximately two thirds of countries in the world are presumed to have seen the deceleration in aggregate production in 2019 than the previous year. Due to this slowdown, many progress have been disrupted, especially in many less-developed and developing countries, and such continued excessive dependence on commodities has become a severe challenge for them. According to *World Economic Situation and Prospects 2020* from the United Nations (UN), a growing number of economies are suffering from the aftermath of the commodity price downturn during 2014-2016, resulting in enduring output decline and obstacles in ameliorating poverty problems. Specifically, the average growth pace of GDP per capita for these commodity-driven countries, mainly developing economies, has shrunk from 2.9% annually during 2010-14 to only about 0.5% in 2015-19. Moreover, in more than 30% of these nations, the average real income per capita is witnessed to be lower today than in 2014 (UN, 2020).

International trade is assumed to be one of the principal reasons causing current slump in global economy, at the same time, the latter in turn exacerbated the former, leading to the worsening situation. According to WTO, the raise in the amount of global traded goods and services slowed down steeply from 3.9% in 2018 to a post-crisis low of 0.3% in 2019. Although the trade tensions are mainly due to the trade competitions between the United States and China, they have become prevailing in more regions and international groups. Reasons of these tensions involve Brexit, the allegations of protectionism, complaints concerning Indian tariffs and a trade conflict between Japan and Republic of Korea.

With the escalation of trade issues, global value chains (GVCs), where the networks of production are located globally, seem to be in turmoil. It takes the advantage of specialization and technology transfer among countries, making it more viable to produce products at a larger scale and therefore boosts the productivity and economic growth. “GVCs have powered an economic revolution over the past three decades”, maintained by the World Bank in 2019. This stimulated a desirable convergence from the late 1980s in terms of per capita income levels: it enabled poor countries to grow faster and keep pace with those rich ones, those countries that fully utilized the opportunity of GVCs and became the integral to these global chains experienced the most noticeable poverty decline, in particular, China, Bangladesh and Vietnam. This growth-driving role of GVCs performs well in the economic booming phase but causes the situation even more complicated during the downturns. Due to its typical character of close connectivity among countries in a production network, the slump in one participating economy is likely to influence other economies, especially in the supply chain, leading to the deterioration in the whole global economy when various of supply chains are involved in trade issues. Currently, the cyclical headwinds have been deepened, especially in the automobile and electronics sectors, both of which cover massive cross-country production networks (UN,

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<sup>6</sup> The effects of coronavirus disease (COVID-19) is not discussed here.

2020). These signs of disruptions in the supply side, meanwhile, suppress global demand for intermediate goods and capital, further causing the persistent downturn in global economy.

Many financial issues, especially financial fragilities, are gradually appearing, represented in elevated indebtedness, financial instability and decreased economies' resilience to shocks. These risks generate a weakening trend in investor risk appetite, an escalation of trade tensions as well as a challenge to macroeconomic or financial structures. As of November, there were 64 central banks in total had curtailed interest rates around the world in 2019, because they have become "the main line of defence" considering the increasing downside risks, falling inflation and the deteriorating economic environment (UN 2020, p.11). Even the United States Federal Reserve reversed course and reduced interest rates for the first time since the global financial crisis in 2008. The UN pointed out that the investment has been largely shrunk in both residential and non-residential components as a result of dwindled international trade, decreased commodity prices and fiscal pressures, and this weakened investment has weighed on countries' growth. Without effective response, these issues could develop into a serious financial crisis, which are mainly banking crisis (the insolvency of a bank), currency crisis (currency devaluation) and speculative bubbles and crashes (a crash in asset prices).

What's worrying, these complications appeared in finance, investment as well as aggregated output have posed a formidable challenge to the least developed countries (LDCs), which are highly dependent on external development finance and foreign aid, and these ongoing weaker productive capacities in most countries make it more difficult for LDCs to obtain investment. According to Least Developed Countries Report (2019), there is a large decline in aid flows from other countries to LDCs. To be more specific, the proportion between the magnitude of Official Development Assistance (ODA) and Gross National Income (GNI) dropped from 16% to 10% during the period of 1990-2000, afterwards, a minor climb can be seen in the early 2000s before declining again to around 7% in 2017. Such drop aggravated the economic slowdown in LDCs, especially those most vulnerable ones. More grim situation can be found in their debt conditions, released by the World Bank and International Monetary Fund (IMF), 5 of 46 LDCs have been in debt distress by May in 2019, and 13 have been classified in high risk debt distress. Furthermore, most of these countries received debt relief not long ago.

This debt crisis leads to the slower progress to poverty reduction—one of the essential goal of the 2030 Agenda for Sustainable Development, which aims to achieve a noticeable shrinkage in inequality as well as a remarkable soar in income growth. For stimulating economic growth, LDCs have long struggled with structural transformation, but their persistent current account deficits and unfavorable economic conditions, to a large extent, have hindered this transformation. Undoubtedly, the deterioration of global economy has posed a variety of arduous threats to almost every country, particularly the financial instability suffered by vulnerable LDCs. What's worse, this slowdown is reckoned to post long-lasting effects in the following years. Specifically, the per capita income in one fifth of countries will continue to decline or stagnate in 2020. Anticipated progress to better living standards would also stall in many countries, and this stagnation seems to last longer. Average real income in around 30% commodity-dominated developing countries (with 870 million people in total) will be lower today than they were in 2014 (UN, 2020). Calculated by per capita, the global economy is estimated to expand slower, at 1.5% in 2020 and 1.7% in 2021 with large divergence across countries. This undesirable situation could even be worse and persistent because of the overwhelming outbreak and global spread of Coronavirus, which leads to the suspension of innumerable business and financial activities. Moreover, these short- and long-term risks and shocks together with global climate crisis are developing into a serious economic threat for

many countries. In such unpredictable context, economists and policy-makers have become more craving for identifying the effective and efficient growth-driving forces before the situation getting more exacerbated.

### **2.1.2 The Emerging Economy**

Although the extensive deceleration in economic growth is almost sweeping every country with impending economic and social hazard, there is another group——emerging economies still performing well, especially emerging Asia<sup>7</sup>.

It is necessary to define an emerging economy (also named as emerging market or emerging market economy) before conducting further analysis. This term was first proposed by the World Bank economist Antoine Van Agtmael in 1981, which has been widely-used to specify countries in the process of turning into developed countries. They are characterized to have lower per capita income compared with developed economies, typically have regulatory bodies and exchanges, and experience high growth. Emerging economies now are playing an essential role in encouraging global growth, excessive 80% of which is composed by emerging markets with some large countries included, such as China, India and Russia.

According to OECD (2019a), GDP growth rate of emerging economies still remained high, particularly emerging Asia, at 6.3% in 2019, almost tripled the global pace (around 2.3%), and this favorable growth path is predicted to keep robust by an annual average of about 6.1% during the period of 2019-2023. Within the same time span, the CLM countries (Cambodia, Lao PDR and Myanmar) is forecasted to increase the swiftest among the entire ASEAN (the Association of Southeast Asian Nations) bloc with respect to economic expansion, at the growth rate of 6.9%. This high speed can be contributed by its large trade volumes, to a large extent. As the world's fourth largest exporting group, ASEAN accounts for only 3.3% of Global value, but constitutes more than 7% of total exports of the world, this is partly because of its mature supply chains and related open trade policies. Such openness is not only within the emerging countries, but also expands to the whole world, with the provision of many preferential tariffs to non-members by ASEAN. Some trade agreements, for example, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), have reached consensus and successfully linked these emerging economies with broader free trade zones. Moreover, further progress towards free trade with more countries is likely to be achieved in 2020, one of which is the agreement concerning the Regional Comprehensive Economic Partnership (RCEP) including “all ten ASEAN countries, six other Asian-Pacific countries with which ASEAN has existing free trade agreements (FTAs): Australia, China, India, Japan, Korea, and New Zealand” (OECD, 2018b, p.28). The approval of this negotiation would facilitate more trade in emerging economies, and therefore, stimulate its growth to a higher rate, since it is expected to reshape a more binding and committed agreement which expands beyond existing economic cooperation framework.

Digitalisation is another factor stimulating economic growth both in global and emerging economies. Studies show that every 10 percent points rise in Internet penetration can lead to 0.77 percent points in GDP growth in developed regions and even more in emerging economies——1.12 percent points (Zhen-Wei Qiang et al., 2009). In the mobile broadband sector, there is approximately 90% of the growth is accounted by emerging markets in the last five years

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<sup>7</sup> Emerging Asia refers to the ASEAN-10 which includes, Brunei Darussalam, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam.



(IEA, 2017). The advancement in digital area renders more e-commerce in emerging markets. Indicated by McKinsey (2016a), there would be an increasing number of the online users involved in e-business, and it is projected that almost 3.7 trillion dollars more would be generated annually by this sector before 2025, which are mainly from online payments, digital savings accounts and mobile wallets.

As the forerunner of e-commerce, the majority of this high transaction volume is expected to be achieved by China, with a developed digital market offering various of payment methods, reliable digital wealth management products as well as numerous financing schemes, such as peer-to-peer lending and supply chain financing (McKinsey, 2016b). Although the customers of China's e-business are mostly from the domestic market, it is now accelerating and extending to a global digitalized market. Apart from this, China's conspicuous economic progress during recent years have also been reflected in the investment. As the rise of Chinese market, a climbing number of foreign capital flows to China since the 1990s, and recently, the soar in its Outward Foreign Direct Investments (OFDI) is also notable. During the period of 2008-2016, China's OFDI expansion experienced 20% growth rate on average, and the OFDI stock was second only to the US, nearly 30 times its 2000 level (OECD, 2019a). Nowadays, China's OFDI accounts for about 11.1% of global aggregate flows and nearly 6% of global total OFDI stock. Such boom is presented by its marked escalation in global Mergers and Acquisition (M&A), and this high speed expansion drives more Chinese companies to the top Fortune Global 500 rankings, where the number rocketed rapidly after the global economic crisis, from 20 to 129 during 2008 and 2019. Due to its focus on Engineering and Construction industry, the top five slots are all occupied by Chinese companies, with the China State Construction Engineering Corporation (CSCEC) ranking first. As for the financial sector, despite some criticized problems of allocation efficiency implied by the relatively high debt of Chinese companies (see OECD, 2019b; Zhong, Xie and Liu, 2019), China has covered the top four positions of the largest banks all over the world by assets. The Industrial and Commercial Bank of China (ICBC, one of the Big Four state-owned banks in China) ranked first, which first appeared on the Global 500 in 1999 and now, has been the largest lender in the world.

Not only China, but also other emerging economies, such as India, are widely and quickly enlarging their markets. It is predicted that nearly 25% of global total GDP will be constituted by China and India alone in 2030, with the global main markets shifting from the US and the EU to China and India, and accompanied with the change of world economic decision-making power. It is presumed that "more than half of the projected increase in global energy use is likely to originate from China, India and other Asian countries, driven by strong growth in their energy-intensive industrial sectors" (UN, 2020). Due to its economic outperformance, East Asia continues to be the fastest developing region around the world and has been regarded as the largest contributor of global growth.

Considering the remarkable economic progress in emerging markets, exploring the economic-propelling powers of this group, especially trade and financial factors which are large contributions of their overall growth, is likely to be the way for alleviating and boosting current global economic downturn.

## 2.2 Literature Review

### 2.2.1 Research Concerning the External Factors

#### *Trade Openness*

It has been a widely-accepted view that trade, hitherto, is one of the most powerful driving forces for shaping economic performance and stimulating the growth. Due to this, many countries tend to execute trade liberalization policy which encourages removing trade barriers, and adopts related export-led strategies when struggling with poverty issues. The implementation of these tactics in OECD countries is a good example. In this group, the role of international trade in achieving economic growth has been more valued, together with the considerable benefits with the application of WTO Trade Facilitation Agreement (OECD, 2020). Theoretical frameworks of such trade-growth nexus are mainly from the concept of two strands, neoclassical approaches and endogenous growth factors (Romer, 1994). The former explains the benefits from trade openness through comparative advantages, which is proposed by Ricardo (1817), stressing that the gains from international trade are contributed by different abilities and the specialization of two countries in producing a certain good<sup>8</sup>. In other words, one agent can generate the same amount of yields at a relatively lower opportunity cost or autarky price than another agent because of factor endowments. Conversely, the latter asserts that the economic growth is the consequence primarily arose by endogenous rather than external factors, attributing the rise in income and productivity to the accumulation of technology or human capital which are brought by spillover effects of trade openness. Both Grossman and Helpman (1990, 1991) and Almeida and Fernandes (2008) are in favour of this assertion, further arguing that these desirable effects together with trade openness are more overwhelming in developing countries. It is unilateral or multilateral trade that connects these countries with better-developed economies, in the meanwhile, largely facilitates the diffusion of more advanced technology and knowledge through imports and exports.

Based on these supportive theoretical groundwork, considerable scholars endeavour to provide empirical evidence of the link between trade and growth, contributing to a large body of convincing research for the positive effects of trade presented in the economic progress. For example, Nannicini and Billmeier (2011) utilize the synthetic control methods to demonstrate that trade liberalization is positively related with the real GDP per capita, when focusing on a sample of transition economies. This finding is still valid when changing the observations to developing countries in Sakyi, Villaverde and Maza (2014) and the G20 group in Pradhan et al. (2017) with different estimation methodologies. Specifically, Sakyi, Villaverde and Maza (2014) consider a non-stationary heterogeneous panel model to handle the problems of cross-sectional dependence and the endogeneity of trade liberalization, and their conclusion is not only consistent with previous research, but also proposes that the correlation between trade and income level is more significant for upper-middle-income countries than that for the lower-middle income countries. While employing a panel cointegration model in the context of interaction with gross capital formation, financial depth and foreign direct investment to explore trade-growth nexus, Pradhan et al. (2017) show that notwithstanding these are all

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<sup>8</sup> In contrast to Ricardo (1817)'s labor intensive exports, Sutton (2012) focuses on capital-intensive ones, who raises a different perspective and considers firms' capabilities as the immediate and more significant reason for countries' wealth. He argues that "if you don't start out with a firm that has the appropriate capabilities, installing capital equipment won't help" (Sutton 2005, p.2). Moreover, this study points out that it is essential to establish a closely-linked relationship between financial access (provision) and active interventions for the purpose of cultivating improved firms' capabilities.

causative factors for economic prosperity in the long term, trade openness is proved to have a more noticeable and significant impact, and these results have been supported by Granger causality tests.

However, such predominant role of trade openness in economic upswing is also salient in a converse situation—economic downturn. Dal Bianco, Amini and Signorelli (2017) exploit a panel of 122 emerging economies, observed from 2008 to 2010, to compare the output response of trade openness, capital openness with other financial related factors to the global crisis shock. They found that compared with other considerations, trade openness plays a primary role in emerging economies and it has aggravated output damages to some extent when suffering economic crisis. In addition, their fixed-effect estimators efficiently avoid the omitted variable bias caused by the serious time invariant heterogeneity of sampled countries, such as resource abundance and morphology.

### *Capital Openness*

Regarding the dominant causes of economic expansion, a substantial body of economists stress the power of capital openness in explaining output increase, both from exogenous and endogenous aspects. Solow (1956) and Swan (1956) introduce there are three factors leading to economic growth, which are capital accumulation, productivity and labor growth, and they point out that the total output can be promoted by technological progress, since there is a long-term equilibrium among these factors, also known as steady state growth. In other words, once one factor changes, there will be proportionate variation in the remaining factors. Although the endogenous theory is also in favor of capital's economic effect, they argue that some weaknesses exist in Solow-Swan model (which is set within the exogenous theory) and they propose the AK model, which straightforwardly explains the linear relationship between economic production and the volumes of capital (Uzawa, 1965; Sidrauski, 1967; Lucas, 1988; Rebelo, 1991; Ortigueira and Santos, 1997). In addition, it is assumed that capital inflow, in particular, foreign aid and foreign domestic investment (FDI), favourably affects the economic progress of the host country by deepened market competition environment, enlarged market formation, advanced technology as well as other beneficial spillover effects, see Gorg and Greenway (2004), Gomanee et al. (2005), Ndambendia and Njoupouognigni (2010). Nonetheless, many scholars doubt the existence of this link between capital openness and growth, according to Bhagwati (1998, p.7), "the claims of enormous benefits from free capital mobility are not persuasive".

These controversial opinions are even more extensive with regard to empirical research. Saibu (2014) utilizes the Principal Component Analysis (PCA) approach and Autoregressive Distributed Lag (ARDL) testing technique to provide reliable support for the growth-enhancing role of capital openness in the economic prosperity by focusing on Nigeria. Dogan (2014) and Elian and Suliman (2015) reach the consistent conclusion when also based on the single country data of Zambia and Jordan, differently. Butkiewicz and Yanikkaya (2008) not only proves the positive capital-growth nexus, and maintain the negative effects resulted by capital restrictions is mainly due to declined FDI, but also challenge the threshold assumption which believes benefits from capital inflows only appear when countries achieve a certain level of development or human capital. However, Khadraoui (2012) represented different results. Although this research favours the prominent growth-contributing effect of capital when estimating on the data of 70 countries from 1970 to 2009 with the Generalized Method of Moments (GMM) estimator, the results imply that there is, in fact, a threshold effect caused by financial environment exists in the capital-growth causal link. From this finding, they further

point out that economies with better-developed and more complete financial sectors gain more benefits from capital liberalization than those with a worse-developed one.

Other studies, such as Chanda (2005), observe either negative, insignificant or complicated impacts of capital openness on economic development. He pioneered an original strand, proposing that the influence of free capital mobility on economic growth depends on a country's ethnic and linguistic heterogeneity degree. This means the capital controls in countries with higher degrees of heterogeneity can cause more immense inefficiencies and worse economic performance, while for countries without such heterogeneity, the policy concerning capital controls serves as a contributor in stimulating the economic upturn. This relationship also varies during different time periods. For example, applying the Seemingly Unrelated Regression (SUR) system as well as Granger causality test, Frimpong and Abayie (2006) examine the effect of FDI on Ghana's economy during the period of 1970-2002, uncovering that there is no evidence supporting FDI-led growth for the entire observation period and the pre-structural adjustment program (SAP) period (1970-1983), however, there is positive causality between FDI and GDP increase during the post-SAP period (1984-2002). Additionally, the repercussion of capital flows can change according to different kinds of flows and economic structures. Aizenman, Jinjark and Park (2013) adopt a large dataset including 100 countries from 1990 to 2010 and conclude that the robust correlation lies between FDI and GDP growth, while the nexus of equity-growth is weakened and less stable. Such positive link, however, disappears in the short-run debt before financial crisis, and even becomes sizably negative during the crisis. More recently, Setyari, Rustariyuni and Aswitari (2016), who exploit the fixed-effect estimator and Feasible General Least Square (FGLS) to address the endogeneity and heterogeneity issues, showing that there is no statistically significant results for capital-growth link in all ASEAN 5 countries (namely Indonesia, Malaysia, the Philippines, Singapore, and Thailand), and even a more outward-oriented economy with higher level of capital intensity is still likely to experience slower economic growth.

In the realm of capital-growth nexus, the Lucas paradox (also named as Lucas puzzle) is under heated discussion, representing the phenomenon that little capital flows from rich countries to poor countries (Lucas, 1990). According to the neoclassical economic theory, poor countries have relatively lower levels of capita per worker compared with rich countries, which explains the growth-driving effect of the capital openness to some extent. In these less developed countries, the returns on per capita are supposed to be higher because of its scarce capital, in this case, investors from more developed countries should regard these poor countries as profitable and desirable places to invest. However, in reality, capital does not flow in this way—from rich to poor countries, which is in contrast to the economic theory. There are mainly two kinds of explanations for this: one points out that it is the difference in fundamentals, such as government policies and technology levels, that affects the production structure of economies, leading to the limited capital amount received by poor nations. The other attributes this unexpected capital flow trend to market imperfections, which includes asymmetric information and sovereign risk, and it is because of a high degree of uncertainty in such market that hinders capital accumulation obtaining from richer countries to poorer ones (Alfaro, Kalemli-Ozcan and Volosovych, 2008; Göktan, 2015).

### ***Inflation***

In addition to trade openness, inflation is another efficient external factor affecting economic development. Tobin (1965) maintains that the higher level of inflation tolerance can contribute to a higher growth rate, which is reverse to potential inflationary risks to increase. Balassa-Samuelson effect implies that faster-growing countries are more likely to experience real

appreciation than slower-growing ones, and generally, the former group economies can be more likely to have higher inflation as they experience real appreciation. In addition, some empirical research performed by Darrat (1988), also provide valuable findings in support of the relationship between inflation and output growth in three Asian developing countries (which are Malaysia, the Philippines and Thailand, respectively). This study conforms with the structuralist view, emphasizing that the correlation between changes in relative prices and the variation in the general price level, in other words, the difference appeared in relative prices are the repercussion of the transformation in economic structures. More recently, Gallegati et al. (2011) apply wavelet technique to uncover the estimation of inflation-growth conjuncture on a basis of US post-war data, which suggests that a frequency-dependent relationship can be identified between them and this link is significantly stable from 1948 to 1993; however, such durable tendency weakens in the aftermath, as the result of the adaption process to a low inflation situation during the wage formation period. Moreover, other studies such as Boschi and Cirardi (2007), Boujelbene and Boujelbene (2010), Barro (2013), Jalil, Tariq and Bibi (2014) have also justified that the fluctuation in the inflation rate can result in the change in economic growth either in the short term or the long term. In spite of the prevalence of Philips curve theory for more than 60 years and extensive research for the positive inflation-growth correlation, there is no consensus about the relationship between these two factors, no matter concerning how this influential mechanism works or the direction of it. Tiwari, Olayeni, Olofin and Chang (2019), for instance, conduct more thorough and comprehensive analysis based on the data of India with the involvement of wavelet and Granger causality tests to add more evidence of explaining the link between inflation and economic development. From the results of spectral density and the time-frequency assessment, they indicate that there is high and climbing dependence existing in inflation-growth nexus especially after mid-2002, while no long-run correlation can be detected. Consistently, Mohan and Ray (2019) also prove the inflation matters for economic growth and identify that there was an high growth rate of 9% in India during a moderate inflation period (2003-2008), accompanied with corresponding surge in credit and monetary aggregates.

### ***Exchange Rate***

The effect of exchange rate in economic growth seems ambiguous and often under debate theoretically and empirically. It is assumed that overvalued exchange rates, which results in macroeconomic instability, are often accompanied by foreign currency shortages, considerable current account deficits, rent-seeking, corruption and balance-of-payments crisis, bringing about immense damages to economic development (Fischer, 1993; Easterly, 2005). Rodrik (2008) argues that the theory, overvaluation hurts growth, while undervaluation facilitates it, does not hold all the time, this is invalid when changing the sample from developing countries to richer ones. Similarly, views concerning the link between exchange rate volatility and growth are also divergent. On the one hand, Cushman (1986) and Perée and Steinherr (1989) construct models to illustrate the volatility of exchange rate is negatively related with trade, and further affects the economic expansion. On the other hand, Franke (1991) and Doyle (2001) maintain opposite attitude, favouring that it is, in fact, the positive relationship that exists between these two variables.

Inconsistent results go beyond theories and also appear in empirical studies. Among them, African countries is a frequently-used observation sample, partly because they economically lag behind and suffer more volatile exchange rates compared with other countries, especially when they began executing a floating exchange rate system since 1980s. Ghura and Grennes (1993) found that there is a negative relationship between the instability of real exchange rate (RER) and real income increase, while Bleaney and Greenaway (2001) demonstrate there is no

significant correlation between RER fluctuation and growth in terms of trade on a dataset of 14 sub-Saharan African countries. Nevertheless, Adewuyi and Akpokodje (2013) point out that the anticipated volatility of exchange rate is positively related with GDP growth for the entire Africa based on a panel data covering from 1986 to 2011, and this research considers both supply and demand channels. However, the results are diverse in two sub-groups, and such positive causal link is more significant in the non-franc zone (Non-CFA group) than the franc zone (CFA group). Beyond African region, empirical findings are still mixed. When adopting the data of Uganda during the period 1960-2011 and exploiting an Autoregressive Distributed Lag (ADL) approach, Katusiime, Agbola and Shamsuddin (2016) prove that the change in exchange rate can contribute to the rise in economic output. Conversely, Boar (2010), targeting at Europe, employs ARCH and GARCH models to analyze the effect of nominal effective exchange rate (NEER) and real effective exchange rate (REER) on growth. Both GLS and GMM estimations validate the existence of the negative nexus between NEER or REER volatility and the economic upturn, but the significance disappears when including related financial development variables. Furthermore, utilizing the dataset of CEE countries during the period from 1995 to 2008, Arratibel et al. (2011) imply that lower exchange rate variation can lead to higher growth, more excess credits and FDI stocks but larger deficits in the current account.

In a nutshell, there are inconsistent results about the relationships between economic growth and these external factors, such as trade and capital openness, inflation and exchange rate. Some factors have been basically approved to have affecting powers on economic development, but controversies about this mechanism still remain, for example, whether this is positive or negative influence. However, for some factors, even the existence of their economic effects is doubted. The divergent findings in the existing literature can be anticipated, given that these research apply different dataset from different countries and various observation time periods.

## **2.2.2 Research Concerning the Internal Factors**

As the benefits of financial development are increasingly emphasized, the diversified economic performance with cross-region difference in the financial structure has raised concern. A growing number of economists and policy-makers are considering whether a bank-based or market-based financial system can make a difference in economic growth, and begin to value the configuration of financial structures. Precisely, a bank-based structure depends more on banks' coordination and supervision to transfer financial resources, while a market-based one relies more on markets' self-adjustment and self-regulation when providing the financial services.

### ***Financial Institutions—the Bank-Based View***

In general, there is a consensus about the comparative merits of bank-based system, reflecting in identifying profitable investment portfolio, effectively mobilizing capital and executing desirable corporate controls, especially in deficient institutional settings and for countries during the early phases of financial development (Sirri and Tufano, 1995; Levine, 2002). Other advantages of banks are also prominent, in terms of the ability of information collection, corporate governance and capital allocation, put forward by Diamond (1984), Ramakrishnan and Thakor (1984). Besides, superior cross-sectional, international and liquidity risk management competence of a bank-based economy is essential and stressed by Allen and Gale (1999). These crucial strengths of bank-dominated economies for spurring growth have been justified by an accumulating number of research. For instance, Allen and Gale (1995) compare the welfare in German and the US, which are typical representatives of bank-based and market-

based economies. They mainly fixate at financial services offered to firms and households. This research found that intergenerational risks can be alleviated in German model by the protection of intermediaries, and this kind of bank system is better at monitoring and controlling companies. Chakraborty and Ray (2006) shed light on the better performance of the bank-based financial system, under which, higher per capita income and investment, together with lower income disparity can be noticed. This can be partially explained by the fact that broad-based industrialization can be more stimulated in bank-dominated countries. Similarly, the main arguments supporting bank-based systems demonstrated by Allen and Carletti (2012) also center around the advent of agency problems and asymmetric information as financial institutions and markets develop. It is banks that act as capable outside monitors to tackle these troubles, particularly in long-term relations between banks and corporations. Consistent with above research, Sahoo (2014) provides more insights about banks' undeniable role in encouraging growth by exploiting ARDL model and Granger causality test, indicating that a bank-based financial structure has more beneficial and significant effects on driving India's economic boom.

In addition to banks' salient benefits, some drawbacks of market-based economies are mentioned by the proponents of the bank-dominated view. Information leakage is one of them, this problem becomes even more serious when financial markets are more mature and sound-established (Stiglitz, 1985; Boot et al. 1993). Also, agency problems are more difficult to avoid in less-coordinated financial markets than bank-based economies, resulting in more post-lending moral hazard (Boot and Thakor, 1997).

By and large, a bank-based financial system is more capable of information gathering and processing, decreasing asymmetric information distortions, handling agent problems by effective supervision, and thereby, contributing to the economic boom in the long run.

### ***Financial Markets—the Market-Based View***

Many economists holding a market-based view underline the priorities of markets in capital allocation, efficient information transmission and solving problems that banks are comparatively weak at. The first supporter of this opinion could be Schumpeter (1934), arguing that financial development, in particular, the value-added services and derivatives accompanied with financial markets, largely, benefits inspiring entrepreneurial innovation, fostering favorable competitions and facilitating funds circulation, rendering it more possible to boost economy. Levine (1991), Holmström and Tirole (1993) and Obstfeld (1994) claim that a growth-stimulating role of well-developed markets is highly remarkable in terms of its flexibility, risk management and corporate governance strengths, in the meanwhile, if a country adopts a more regulatory bank-based financial structure, some undesirable effects are likely to occur since banks usually exert excessive controls over their clients, see Rajan (1992).

Based on these arguments, Allard and Blavy (2011) compare financial recovery ability both in market-based and bank-based economies after analyzing up to 84 economic crisis, concluding that countries with market-dominated systems perform better after crisis and experience distinctly stronger rebounds than countries with bank-based financial structures. Their results also stress the broader economic flexibility of a market-based economy and indicate the vulnerability of a bank-based system, both of which are extremely influential factors for the economic recovery. Focusing on a sample of 36 countries in Africa and 27 emerging economies, Ngare, Nyamongo and Misati (2014) and Naik and Padhi (2015) reach the consistent conclusions. In addition to trade openness, human capital and investment, they find a well-developed stock market also plays a favorable and significant role in stimulating economic

output. Similarly, by choosing South Africa as an observation group, Nyasha and Odhiambo (2015) explore the causal link between bank-based systems, the stock market and economic development covering the period of 1980-2012. With the assistance of ARDL and Granger-causality methodology, their empirical results reveal that the unidirectional causal flow between the stock market and economic growth is significant in both short and long term. Moreover, this research fails to detect the causal linkage between bank-principally financial systems and economic growth. Utilizing the same empirical technique, further evidence in support of market-based financial systems can be found in Nyasha and Odhiambo (2017)'s study, which points out a market-dominated financial structure exerts a more beneficial and extensive impact on Kenya's progress, and such positive influence cannot be found in a bank-based system. These research, therefore, imply that the considerable advantages of financial markets in economic growth should be taken into account, especially considering its relatively flexible and invulnerable qualities.

Although there are abundant theoretical and empirical research explaining the dominant role of financial development, no matter for the bank-based or market-based view, some studies found that a country's development is not heavily dependent on external finance, while other factors are more crucial for economic growth, which has been proved by Beck and Levine (2003). They analyze the theories concerning bank-dominated and market-dominated structures, the law system as well as financial services by probing the links between these explanatory variables and economic growth. However, their results cannot give support to either the bank-based or market-based view, but unexpectedly, found that it is financial services and the legal system that matter more for the growth.

### ***Financial Services***

When people are arguing about the comparative merits of bank- and market-dominated structures, some scholars assert that financial services, the ability of financial systems to improve information collection and curtail transaction costs, should be the first-order issue while the debate concerning the financial structure is of second-order importance (Levine, 1997). Huybens and Smith (1999) suggest that markets and banks could be regarded as complements or channels for providing these financial services. Such financial services view minimizes the repercussions of financial structures on economy but emphasizes the fact that financial arrangements, in particular, intermediaries, emerge to provide various financial services for ameliorating market imperfections. According to Levine (2002), the development of financial services benefits corporate control and supervision, the evaluation of investment portfolio, liquidity facilitation, risk management and simplifying the process of savings mobilization. It is believed that these economic benefits are caused by the effectiveness of financial services rather than the difference in financial structures. Therefore, for achieving economic expansion, building a favorable environment where capable intermediaries can provide sound and efficient financial services is the way to go.

### **2.2.3 Research Concerning Other Factors**

In addition to above economic external factors, such as trade openness and inflation, and internal factors which cover the development of financial markets and institutions, other determinants of economic growth are put forward, and some even argue that they are more effective in improving economy.



### *The Law System and Governance*

The law system is another potential cause which is likely to enhance economic performance, and it is believed that the legal origin, mainly common law and civil law, can affect a country's output. This law-economy nexus is pioneered by Raphael La Porta, Florencio Lopez-de-Silanes, Andrei Shleifer, Robert Vishny (LLSV hereafter), attracting a voluminous body of discussion afterwards. On the grounds of the evaluation of 49 countries, LLSV (1997) maintain that the development levels are various among countries with different law systems, and common law countries tend to perform better with regard to government governance, investor protection and the access to equity finance compared with civil law countries. Based on a sample consisting of 102 countries during the period of 1960-1992, Mahoney (2001) verifies the growth-enhancing effects of common law and shows that on yearly average, countries with the common law system presented approximately 0.71% faster growth rate than countries applying civil law. Besides, this study indicates the common law countries can profit more, possibly since contracts rights and property security are more guaranteed in these countries. Djankov et al. (2008) use an original way to investigate the relationship between the legal origin and economic development by inspecting debt enforcement efficiency in 88 countries, finding that the legal origin can significantly affect the efficiency of debt enforcement, and countries with common law system outperform countries with other systems. LLSV (2008) further contributes to proving the essential role of common law in a country's economy after improving their previous research, and the results display that common law countries are more superior no matter from the capital market, financial institution or government regulation. Following Beck, Demirgüç-Kunt and Levine (2003), Simplice (2011) utilizes Two-Stage-Least Squares (TSLS) to detect the law-finance nexus in the case of Africa, his results generally support LLSV (1998, 2008) and Beck et al. (2003), suggesting that English common law countries have more advantageous financial conditions in respect of depth, activity and size than French civil law countries.

Recently, the superiority of common law in stimulating economic growth has almost become the general consensus. It can be argued that the variation in many critical economic institutions is principally resulted from the legal origin, indicated by stronger legal rights and protection to both shareholders and creditors in common law countries than others. Regarding the development of legal origins, one primary explanation is their formation is due to historical accidents, to a large extent related to European colonialism (Acemoglu et al., 2005). "For example, Latin American countries adopted the Napoleonic codes in the nineteenth century because these were more compatible with their Spanish legal heritage. Importantly, the fact that Latin American countries therefore have 'French legal origin' is due to a historical accident and can be treated as exogenous with respect to current institutional outcomes" (p.426).

Nevertheless, another voice as to the economic role of legal law systems gradually appears, claiming that the legal origin, in reality, cannot cause change in economic growth. Dam, the former Deputy Secretary of the State, maintains the sceptical attitude about the law-growth nexus, and he delves into this, suggesting "although much has been written . . . that developing countries that inherited a common law system have a development advantage over those that inherited a civil law system, . . . there is little merit to that idea" (Dam, 2006, p.24). He also indicates that the existing research favouring the economy-stimulating function of a certain law, the common law usually, should be re-examined, especially the interpretation of their results. Klerman et al. (2009) further proved Dam's idea, who perform their investigation on 98 countries with an improved legal origin coding when considering colonial origin as life expectancy, disclosing that there is no correlation existing between the legal origin and economic development. Other opponents against the legal origin theory, such as Roe and Siegel

(2009), reveal that it is not law systems but political stability that should be accentuated for identifying the driving forces of economic development.

### ***Technology***

Indicated by the International Telecommunications Union's (ITU) database, a steep soar from 16.8% in 2005 to 53.6% in 2019 can be seen in the internet penetration (the proportion of individuals using the internet) as the increase of the aggregate economic output. This tendency leads a rising number of experts to investigate the effect of technology on an economy. Jorgenson (2001) outlines a framework to scrutinize the role of information technology (IT) in the American economic resurgence and found that the deployment and development of semiconductors lead to the relentless decline in IT prices, in the end, contributing to economic growth in America. Roller and Waverman (2001) obtain the evidence from the data of 21 OECD countries to prove the link of IT-growth, who suggest the telecommunication infrastructure positively affects the economic development, and such desirable impact is more noticeable when a critical mass of communications infrastructure exists. Qiang et al. (2004) indicate that information and communications technology (ICT) utilizes economies of scale, technological innovation and the reorganization of production to realize intensified capital and more importantly, the increased total factor productivity (TFP) growth of the whole economy.

Digital technology, indeed, largely accelerates economic growth, especially in emerging markets. Zhen-Wei Qiang et al. (2009) found that every 10% points rise in the Internet penetration results in 0.77% points climb in GDP per capita in developed countries and 1.12 % points raise in emerging markets. Furthermore, there would be 1.21% points of GDP per capita increase in developed countries and 1.38% upswing in emerging economies with each 10% points expansion of broadband. Consistently, Zagorchev, Vasconcello and Bae (2011) also validate the positive influence of ICT on GDP per capita, and Bagchi (2017) mentions the abilities of government institutions are enhanced because of the advantageous qualities of their IT systems, leading to more efficient executive, more stable social and economic environment. In addition, business operations have been transformed by the adoption of advanced technology, and meanwhile manufacturers are pushed to a favorable production revolution, which will bring profound positive effects in terms of skills, productivity, income, well-being to the whole society (OECD, 2017).

### ***Environment***

As all countries are sparing no effort to pursue economic expansion unanimously, the appearance of an increasing number of environmental issues, such as air pollution, loss of biodiversity, Ozone layer depletion, global warming and deforestation have caused many people's concern. With the development of urbanization and industrialization, the overexploitation accelerates the speed of depleting natural resources around the world, leading to the frequent occurrences of natural disasters in these decades, particularly, hurricanes and tsunami. These overwhelming destructive natural events have caused considerable loss of human lives and damage to property. What's worse, such disastrous damage can be long-lasting, which requires several years to repair, let alone the immense economic losses represented in output, physical and human capital. In addition, it is paradoxical to find that the life quality has worsened as the growth of material prosperity (Caldwell, Hayes and MacWhirter, 1976). Environmentalists explain that an obsession with GDP or GNP (Gross National Product) can be misleading, if the costs of extensive waste production and depleting resources are ignored. This is because they tend to be good indicators in terms of evaluating economic output but not when it comes to human well-being, where these desirable growing

figures are more likely to represent unpredictable hazard. Consequently, people began to doubt and reexamine whether it is worthwhile to achieve economic boom at the expense of ecological balance. It is such apprehension that leads to a wealth of literature focusing on the relationship between environment and development.

The environmental Kuznets (EKC) hypothesis is one of the most significant theory in the realm of environment-growth relationship, which indicates that the solution to environmental pollution is economic growth, meaning that economic development can, in reality, be beneficial for dealing with environmental problems. Specifically, this conclusion is based on an inverted-U shape between environmental quality and economic growth, which shows the environmental degradation can be improved as the rise of GDP or average income after reaching the turning point over the course of economic expansion (Grossman and Krueger, 1991). This environment-growth curve can be observed in different causes of environmental deterioration, such as air pollution, water and the ecological footprint<sup>9</sup>. Dinda (2004) reviews existing literature covering theoretical and empirical studies concerning the EKC phenomenon, and she finds that although this hypothesis has been questioned due to the limited application of air quality indicators to it, the EKC theory can be empirically valid, and residents with higher income levels tend to have a stronger environmental awareness. However, there is no consensus among these findings about the key turning point at which environmental deterioration begins to be alleviated.

Undoubtedly, this assumption subjects to continuous debate, since the EKC cannot be applied into some natural resource use, other pollutants and biodiversity conservation. For instance, aggregate energy use is still increasing in a considerable number of countries, although the proportion of energy per GDP has decreased. Stern (2004) argues that the statistical analysis supporting the EKC is not robust and valid, and little evidence is in favor of the common U-shaped trend that economies follow as their average income raises. This is consistent with Copeland and Taylor (2004)'s finding, stating that: "Our review of both the theoretical and empirical work on the EKC leads us to be skeptical about the existence of a simple and predictable relationship between pollution and per capita income" (p8).

More recently, Ozturk and Al-mulali (2015) employ GMM and the Two-stage Least Squares (TLS) estimators to find out this environment-growth U-shaped link does not exist in the case of Cambodia over the period of 1996-2012; instead, the effective governess and corruption control can play more significant roles in reducing CO<sub>2</sub> emissions. Tang et al. (2016) utilize VECM and Granger causality test to reveal that there is a stable and long-run equilibrium between economic growth and energy consumption in Vietnam, and the unidirectional causality from energy consumption to economic development can also be observed. Their results are in line with Vietnamese energy-dependent economic policy, although this is at the cost of environment. Gill et al. (2017) found that the EKC hypothesis is not econometrically sound, and the massive environmental cost cannot be balanced or absorbed by this resource intensive growth strategy. Acaravci and Akalin (2017) analyse the environment-growth nexus based on the data of 40 high-income and 33 upper-middle-income countries covering the period of 1998-2010. Their results show that the EKC hypothesis is not convincing in developing economies while some evidence favouring this hypothesis can be found in developed countries. Besides, there is no sign of environmental improvement which is accompanied with the income

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<sup>9</sup> The ecological footprint is an approach that evaluates people's demand on nature by an ecological accounting system, which can be accounted by individual, region, nation and other scales, but often accounted by per capita ecological footprint analysis (EFA). This is a useful measure to show human influence on the whole ecosystem and indicate the sustainability of individual or national development (Rees, 1992; Wackernagel, 1994).

increase in developed economies. Pontarollo and Muñoz (2020) examine the EKC by focusing on land consumption and followed environmental spillovers, which use the data of 221 cantons in Ecuador from 2007 to 2015. They argue that the U-curve hypothesis is not credible and the spatial spillovers are limited; besides, the better policy and institutional coordination for land use management are indicated by this study.

Based on these research, it can be seen that the EKC hypothesis is not well-founded in reality, which means economic growth is almost not compatible with environmental improvement. In other words, environment can be negatively affected by economic development, and meanwhile, the deteriorating environment hinders economic growth in the long run. Although the concept of sustainable development<sup>10</sup> has been proposed for many years, and the emergence of Education for Sustainable Development (ESD)<sup>11</sup> enables this principle to be more prevalent and gradually included in many countries' policies, many national and international programs, in fact, are still exploitative in environment in a morally respectable welfare or development cloak (Dahlberg, 1974). Therefore, it is necessary for every country to reexamine and improve their development policies, and establish a sound development approach where a sustainable balance between human being and ecosystems can be achieved.

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<sup>10</sup> Sustainable development is an idea in favour of a desirable balance between the human being and ecosystems, where human needs can be met while ensuring to sustain the capability of ecosystem to cater for future generations' demand of development. This human-ecosystem equilibrium is derived from the United Nations (UN) Conference targeting at Human Environment in Sweden in 1972 and the Brundtland Report in 1987, the latter paid more attention to sustainable forest management at first, then shifted its focus to economic development and environmental protection for future generations (UN, 1972; Turner, 1988).

<sup>11</sup> Education for Sustainable Development (ESD) is a UN project which encourages transformation in knowledge, values, attitudes and skills to create an more sustainable society. ESD aims to enable current and future generations to meet their needs by an interdisciplinary learning methodology which covers economic, environmental and social aspects (UN, 1992).

## Chapter III Empirical Research

### 3.1 Econometric Framework

#### 3.1.1 Econometric Methodology and Data Source

Standard regression methodologies, typically ordinary least squares (OLS), strictly demand that all variables in a regression model should be covariance stationary. This means their means and all autocovariances are not only finite but also are not allowed to change over time. Although OLS has been a widely-used technique to study social and economic problems, it is difficult for all variables in a specification to conform with this stationarity requirement especially when analyzing economy-driving factors, since the data of those growth-related variables usually vary with time. Apart from this, exploring a long-term relationship seems to be more meaningful in a large picture of a country's development, however, normal regression methodologies only focus on short-term nexus. Considering this as well as avoiding the spurious regression issue, this paper employs VECM approach to investigate the principal influential causes of economic growth.

The Error Correction Model (ECM), is designed mainly for probing econometric or social problems when using time-series data, which is a theoretically-driven technique commonly applied on data where cointegration<sup>12</sup> exists, and often applied in the first-differenced variables which have a long-term stochastic trend<sup>13</sup>. The error-correction term implies its estimation function about the previous period's deviation from a permanent equilibrium. The development of ECM is triggered by the attention to the spurious correlation problem in time series research. This means a statistically significant correlation can be tested between two, in fact, unrelated and non-stationary (cointegrated) variables, resulting to the non-valid conclusion in a regression analysis (Yule, 1926; Granger and Newbold, 1974). However, a long-term relationship probably exists between the underlying variables. This leads to the advent of the ECM which can investigate both short-and long-run relationships and keep the level information remained at the same time (Sargan, 1964). Many useful methodologies have been developed based on an ECM to evaluate a dynamic relationship, one famous one is Engle and Granger (1987)'s two-step mechanism. The first step of this approach is confirming the examined time series are all non-stationary in levels, which can be checked by unit root<sup>14</sup> test or ADF test<sup>15</sup>. If all variables are stationary then the standard regressions can be conducted. Alternatively, they are nonstationary but integrated at the same order, the ECM is allowed to be employed, and followed with the next step of OLS estimation (Engle and Yoo, 1987; Stock, 1987).

However, some weaknesses exist in the Engle–Granger method. For example, this approach can only evaluate one cointegrating relationship with one variable specified as explained

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<sup>12</sup> If there is a stationary linear combination of two sets of non-stationary variables, these two variables are considered as cointegrated.

<sup>13</sup> Stochastic trend is an econometric term used for describing a linear relationship between two variables, the slope of which can change over time, and the past value of the explanatory variable has effects on the present response variable. The model for estimating data with a stochastic trend is usually for predicting the long-term relationship. The opposite of the stochastic trend is the deterministic trend, which has a relatively constant slope.

<sup>14</sup> The appearance of a unit root represents this set of variable is non-stationary, since a linear random or stochastic process has a unit root.

<sup>15</sup> ADF test is the abbreviation of augmented Dickey-Fuller test which hypothesizes that there is a unit root existing in a time series variable, indicating that this variable is non-stationary.

variable, this is restricted when multiple cointegrating relationships lie among the estimated variables. Apart from this, the results of this two-step analysis is not completely reliable due to the validity of the long-term parameters in the first stage. Therefore, Johansen's procedure is established to address these deficiencies, also known as VECM, since its error correction function is integrated with the vector autoregression (VAR, a multi-factor model). Without the limitation of the number of cointegrating relationships, every variable can be designated as endogenous and all short- and long-run parameters can be tested with strong statistical power (Johansen, 1988; 1991; 1995; Sims, Stock, and Watson, 1990).

The specification of VECM is as shown in equation (1), a model with the vector error correction function, evolved from the VAR, in which all variables are set as linear functions of their lags. Consider a VAR with  $p$  lags

$$y_t = v + A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_p y_{t-p} + \varepsilon_t \quad (1)$$

where  $y_t$  represents a  $K \times 1$  vector of variables,  $v$  stands for a  $K \times 1$  vector of parameters,  $A_1 - A_p$  are  $K \times K$  matrices of parameters, and  $\varepsilon_t$  is a  $K \times 1$  vector of disturbances. By utilizing some algebra, we can rewrite (1) in VECM form as

$$\Delta y_t = v + \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \quad (2)$$

where  $\Pi = \sum_{j=1}^{j=p} A_j - I_k$  and  $\Gamma_i = -\sum_{j=i+1}^{j=p} A_j$ , while  $v$  and  $\varepsilon_t$  are same with those in equation (1). Presume that  $\Pi$  has reduced rank  $0 < r < K$  so it can be expressed as  $\Pi = \alpha\beta'$ , where  $\alpha$  and  $\beta$  are both  $r \times K$  matrices of rank  $r$ . Therefore, we can finally put the formula as follows:

$$\Delta y_t = v + \alpha\beta' y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \quad (3)$$

With the popularity of VECM in the empirical realm, a series of different frameworks have been developed and widely-used in estimating dynamic models. Park and Phillips (1988, 1989) raise a multivariate regression system allowing for stochastic and deterministic regressors, VAR, as well as other regressors with drift. The main contribution of their research is statistical inference concerning asymptotic distributions both in extreme and common cases, which extends and simplifies earlier work. Similarly, Sims, Stock, and Watson (1990) provide more evidence for asymptotic distribution theory based on the analysis of VAR model with non-stationary variables, and this paper also mentions the validity regarding the logic groundwork of inference and the problem of pretest bias. Stock and Watson (1988) introduce an alternative procedure to test the number of common trends, cointegrating vectors and their autoregressive unit roots. More findings about Johansen's Maximum Likelihood (ML) framework can be found in Ahn and Reinsel (1990), who present the methods and concepts considering asymptotic distribution theory related to the parameters of the proposed model, and the estimation procedure concerning both Gaussian partial reduced rank and asymptotically equivalent two-stage reduced rank. Watson (1994) surveys cointegration, VAR models (with integrated regressors and structural VAR modeling) and VECM, covering all of the above methods, such as the approach for unit root problem, statistical inference, tests for cointegration and estimations. After continuous development and improvement, the VECM methodology has become an efficient approach to explore both short- and long-run relationships. Therefore, a VECM will be applied in the following empirical study.

For the purpose of identifying the more important economic-affecting factors, this dissertation has compared a list of external factors including trade openness, capital openness, inflation and interest rate, as well as various internal factors (financial indicators) covering variables indicating both the development of a country's financial institutions and markets, which are private sector credit to GDP, net interest margin and bank Z-score for financial institutions, and volatility of stock price, turnover ratio and stock market capitalization to GDP for financial markets. On a basis of the existing research and considering the collinearity issues and the model's specification, we decide to choose three most powerful variables of each group into our estimation model and then compare them in depth, see Grossman and Helpman (1990, 1991), Almeida and Fernandes (2008), Pradhan et al. (2017), Allen and Carletti (2012), Allard and Blavy (2011), Nyasha and Odhiambo (2017). After extensive analysis, the estimated factors have been selected shown in Table 1, together with corresponding definitions. The empirical research is executed based on annual observations of China (1995-2017), India (1998-2017), South Africa (1998-2017) and Russian Federation (2001-2017). All data are from the World Bank.

**Table 1** Variable Definition

Variable	Definition
<i>GDP</i>	GDP growth (%)
<i>Trade</i>	Trade openness, represented by the sum of exports and imports ratios to GDP (%)
<i>Credit</i>	Private credit by deposit money banks and other financial institutions to GDP (%)
<i>Volatility</i>	Stock price volatility index

The following empirical process consists of five parts: (1) Unit root tests; (2) Multi-variate cointegration tests; (3) VECM estimation; (4) Postestimation specification tests; and (5) Granger causality test. All empirical results are acquired from STATA, and the cointegration approach of which is built on Johansen's ML framework that has been proved to be exceptionally efficient in inspecting long-term equilibrium, see Gonzalo (1994) and Hubrich, Lütkepohl, and Saikkonen (2001).

### 3.1.2 Unit Root Test

A unit root test is used for checking whether a time series variable is stationary by identifying the presence of a unit root. We apply the augmented Dickey-Fuller (ADF) technique for this purpose and the results have been displayed in Table 2. The testing results indicate that all variables in levels are nonstationary, but significantly stationary in their first differences. This means Johansen Test can be adopted with I(1) order.

**Table 2** ADF Unit Root Test

Country	Variable	Level	First Difference
China	<i>GDP</i>	-1.835	-6.023***
	<i>Trade</i>	-1.454	-3.558***
	<i>Credit</i>	-2.441	-3.565***
	<i>Volatility</i>	-1.816	-7.469***
India	<i>GDP</i>	-3.405**	-7.542***
	<i>Trade</i>	-1.369	-4.557***
	<i>Credit</i>	-1.880	-2.730**
	<i>Volatility</i>	-2.901	-3.837**
South Africa	<i>GDP</i>	-2.790*	-5.103***
	<i>Trade</i>	-2.310	-5.070***
	<i>Credit</i>	-1.963	-3.860***
	<i>Volatility</i>	-2.640*	-4.000***
Russia Federation	<i>GDP</i>	-2.443	-6.846***
	<i>Trade</i>	-2.860**	-5.949***
	<i>Credit</i>	0.551	-3.241**
	<i>Volatility</i>	-2.741*	-3.824**

\*\*\*; \*\* and \* represent the significance level at 1%, 5% and 10%, respectively

### 3.1.3 Multi-variate Cointegration Test

According to the results of ADF test, we can find that series *GDP*, *trade*, *credit* and *volatility* of all countries are nonstationary but stationary after taking the first difference transformation, thus, these variables are qualified to perform the Johansen cointegration test. As shown in Table 3, Panel (a) presents the results for Trace test while Panel (b) displays that for the Maximum Eigenvalue. Regarding the trace test, we begin with  $r=0$  (the hypothesis of that no cointegrating relationships exist) and move upwards to a higher rank in a row, and we stop until we could reject the null hypothesis. For example, we can see from the panel (a) that the hypothesis of  $r=0$  is rejected in China, as the result demonstrating the value of the test statistic (60.0036) is larger than the critical value (47.21 at 5% significance level). However, when we move up to a higher rank test, we fail to reject the hypothesis of  $r\#1$ , meaning that there is at most one cointegrating vector (CV) among these variables in the case of China. This conclusion can be confirmed by the Maximum Eigenvalue tests shown in Panel (b). Similarly, we can conclude that there are 2 CVs in India, South Africa and Russian Federation, meaning that there are two cointegrating equations existing in these countries. In a word, the Johansen test indicates that the long-run equilibrium is expected among *GDP*, *trade*, *credit* and *volatility* in China, India, South Africa as well as Russian Federation, and these results are all significant at 5%.



**Table 3** Johansen Cointegration Test

## (a) Unrestricted Cointegration Rank Test (Trace)

Country	LL	Eigenvalue	Trace Statistic	5% Critical Value
(Hypothesized No. of CE(s))				
<b>China</b>				
r=0	-205.6265	.	60.0036	47.21
r#1	-186.62423	0.80840	21.9990*	29.68
r#2	-179.15622	0.47764	7.0630	15.41
r#3	-175.71101	0.25887	0.1726	3.76
<b>India</b>				
r=0	-162.01946	.	67.4263	47.21
r#1	-145.12263	0.81542	33.6326	29.68
r#2	-133.53387	0.68616	10.4551*	15.41
r#3	-128.90102	0.37079	1.1894	3.76
<b>South Africa</b>				
r=0	-158.3325	.	90.4702	47.21
r#1	-134.74403	0.91651	43.2933	29.68
r#2	-120.54202	0.77574	14.8893*	15.41
r#3	-113.33894	0.53150	0.4831	3.76
<b>Russia</b>				
r=0	-170.25272	.	65.9583	47.21
r#1	-152.52364	0.87579	30.5001	29.68
r#2	-143.09722	0.67011	11.6473*	15.41
r#3	-137.27911	0.49565	0.0111	3.76

\* indicates the rank selected by the test

## (b) Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Country	LL	Eigenvalue	Max Statistic	5% Critical Value
(Hypothesized No. of CE(s))				
<b>China</b>				
r=0	-205.6265	.	38.0045	27.07
r#1	-186.62423	0.80840	14.9360	20.97
r#2	-179.15622	0.47764	6.8904	14.07
r#3	-175.71101	0.25887	0.1726	3.76
<b>India</b>				
r=0	-162.01946	.	33.7937	27.07
r#1	-145.12263	0.81542	23.1775	20.97
r#2	-133.53387	0.68616	9.2657	14.07
r#3	-128.90102	0.37079	1.1894	3.76
<b>South Africa</b>				
r=0	-158.3325	.	47.1769	27.07
r#1	-134.74403	0.91651	28.4040	20.97
r#2	-120.54202	0.77574	14.4062	14.07
r#3	-113.33894	0.53150	0.4831	3.76

**Table 3** Johansen Cointegration Test (continued)

Country	LL	Eigenvalue	Max Statistic	5% Critical Value
(Hypothesized No. of CE(s))				
<b>Russia</b>				
r=0	-170.25272	.	35.4582	27.07
r#1	-152.52364	0.87579	18.8528	20.97
r#2	-143.09722	0.67011	11.6362	14.07
r#3	-137.27911	0.49565	0.0111	3.76

### 3.2 VECM Estimation

The results of long-run links for China, India, South Africa and Russian Federation can be found in Table 4. According to the estimation results, there are two cointegrating relationships in all countries except China, which only has one cointegration equilibrium with all variables included in the same equation. Specifically, we can see that in the case of China, *GDP* is significantly correlated with *trade*, *credit* and *volatility* in divergent degrees, at 1% significance level (Panel (a)). It is worth mentioning that trade openness (-0.1414304) is negatively related with China's GDP growth in the long term, which is inconsistent with the general expectance.

However, such single tri-variate equilibrium has been divided into two relationships in the rest three countries. From Panel (b), (c) and (d) of Table 4, we can find that there is no mutual inclusive link with all variables correlated in a single model in India, South Africa and Russian Federation in the long term, but two sets of separated equilibrium exist, one with *GDP* and the other with *trade* included while *credit* and *volatility* are involved in both two equations. Moreover, the *credit* is positively correlated with *GDP* only in Russian Federation (but not significant), while *volatility* is only negatively related with *GDP* in South Africa at 1% significance level. As for the equations with *trade* covered, both *credit* and *volatility* have positive effects on *trade* in Russian Federation, on the other hand, these two variables negatively affect trade in both India and South Africa. The long-term equilibrium among *GDP*, *trade*, *credit* and *volatility* for China, India, South Africa and Russian Federation are presented in equations (4)-(10), and the equations for VECM are presented in (11)-(14).

#### **China:**

$$GDP_{t-1} = -3.305469 - 0.1414304trade_{t-1} + 0.028218credit_{t-1} - 0.0716187volatility_{t-1} \quad (4)$$

#### **India:**

$$GDP_{t-1} = -5.126507 - 0.0702652credit_{t-1} + 0.1252769volatility_{t-1} \quad (5)$$

$$trade_{t-1} = 11.19007 - 1.296626credit_{t-1} - 0.2981936volatility_{t-1} \quad (6)$$

#### **South Africa:**

$$GDP_{t-1} = 9.688808 - 0.0239533credit_{t-1} - 0.4756675volatility_{t-1} \quad (7)$$

$$trade_{t-1} = 13.76581 - 0.4426603credit_{t-1} - 0.6741673volatility_{t-1} \quad (8)$$

**Russian Federation:**

$$GDP_{t-1} = -133.8124 + 0.089996credit_{t-1} + 3.677759volatility_{t-1}(9)$$

$$trade_{t-1} = -306.2383 + 0.0701575credit_{t-1} + 7.198673volatility_{t-1}(10)$$

**Table 4** The results of Cointegration Equations

(a) China

Cointegrating Eq:	CointEq1
GDP(-1)	1
Trade(-1)	-0.1414304***
	[0.0072254]
Credit(-1)	0.028218***
	[0.0056871]
Volatility(-1)	-0.0716187***
	[0.0065313]
C	-3.305469

GDP(-1), Trade(-1), Credit(-1) and Volatility(-1) denote the variables in first differences, C denotes the constant

\*\*\* denotes 1% significance level

[ ] denoted the value for the standard error

(b) India

Cointegrating Eq:	CointEq1	CointEq2
GDP(-1)	1	omitted
Trade(-1)	omitted	1
Credit(-1)	-0.0702652***	-1.296626***
	[0.0234915]	[0.0472045]
Volatility(-1)	0.1252769***	-0.2981936***
	[0.0449013]	[0.0902258]
C	-5.126507	11.19007

(c) South Africa

Cointegrating Eq:	CointEq1	CointEq2
GDP(-1)	1	omitted
Trade(-1)	omitted	1
Credit(-1)	-0.0239533	-0.4426603***
	[0.0443473]	[0.0841234]
Volatility(-1)	-0.4756675***	-0.6741673***
	[0.1141015]	[0.2164418]
C	9.688808	13.76581

## (d) Russian Federation

Cointegrating Eq:	CoIntEq1	CoIntEq2
GDP(-1)	1	omitted
Trade(-1)	omitted	1
Credit(-1)	0.089996	0.0701575
	[1.52404]	[3.116939]
Volatility(-1)	3.677759***	7.198673 ***
	[1.141508]	[2.334592]
C	-133.8124	-306.2383

*The VECM estimation for China:*

$$\begin{bmatrix} \Delta GDP_t \\ \Delta trade_t \\ \Delta credit_t \\ \Delta volatility_t \end{bmatrix} = \begin{bmatrix} -0.0329 \\ -1.2694 \\ 1.5935 \\ -0.9395 \end{bmatrix} + \begin{bmatrix} 1.5688 & 0.5397 & -1.0812 & 3.0305 \\ -0.0850 & 0.5918 & -0.3869 & -0.9931 \\ -0.0135 & 0.4078 & 0.8466 & 0.5931 \\ -0.0797 & 0.1134 & -0.0597 & -0.3343 \end{bmatrix} \begin{bmatrix} \Delta GDP_{t-1} \\ \Delta trade_{t-1} \\ \Delta credit_{t-1} \\ \Delta volatility_{t-1} \end{bmatrix} + \begin{bmatrix} 0.3353 & -2.4188 & 0.9516 & 4.9775 \\ 0.0446 & 0.4622 & -0.0917 & 0.4047 \\ -0.0608 & -0.0782 & -0.4886 & -0.4886 \\ 0.0174 & 0.0150 & -0.1920 & 0.0506 \end{bmatrix} \begin{bmatrix} \Delta GDP_{t-2} \\ \Delta trade_{t-2} \\ \Delta credit_{t-2} \\ \Delta volatility_{t-2} \end{bmatrix} \quad (11)$$

*The VECM estimation for India:*

$$\begin{bmatrix} \Delta GDP_t \\ \Delta trade_t \\ \Delta credit_t \\ \Delta volatility_t \end{bmatrix} = \begin{bmatrix} 0.5662 \\ 0.0456 \\ 1.3288 \\ -0.1280 \end{bmatrix} + \begin{bmatrix} 0.8215 & -1.0520 & -2847 & 1.6770 \\ 0.4188 & 0.2620 & -0.0429 & -0.9579 \\ -0.3205 & -0.8315 & 0.0156 & 6.9158 \\ 0.1705 & -0.3529 & -0.0847 & 0.7319 \end{bmatrix} \begin{bmatrix} \Delta GDP_{t-1} \\ \Delta trade_{t-1} \\ \Delta credit_{t-1} \\ \Delta volatility_{t-1} \end{bmatrix} + \begin{bmatrix} 0.1588 & -0.5291 & 0.0898 & -1.1663 \\ 0.0446 & 0.4622 & -0.0917 & -2.8342 \\ -0.0608 & -0.0782 & -0.4886 & -0.4720 \\ 0.0174 & 0.0150 & -0.1920 & -0.4681 \end{bmatrix} \begin{bmatrix} \Delta GDP_{t-2} \\ \Delta trade_{t-2} \\ \Delta credit_{t-2} \\ \Delta volatility_{t-2} \end{bmatrix} \quad (12)$$

**The VECM estimation for South Africa:**

$$\begin{bmatrix} \Delta GDP_t \\ \Delta trade_t \\ \Delta credit_t \\ \Delta volatility_t \end{bmatrix} = \begin{bmatrix} 0.3500 \\ 0.5854 \\ 2.1079 \\ -1.0273 \end{bmatrix} + \begin{bmatrix} 0.3063 & -3.1632 & -1.2847 & -2.8934 \\ -0.0538 & 0.6853 & -0.3489 & 0.3283 \\ -0.0353 & -0.4767 & 0.8390 & -0.0747 \\ 0.2009 & -0.1829 & 0.7939 & -0.0686 \end{bmatrix} \begin{bmatrix} \Delta GDP_{t-1} \\ \Delta trade_{t-1} \\ \Delta credit_{t-1} \\ \Delta volatility_{t-1} \end{bmatrix} + \begin{bmatrix} -0.2647 & -1.9941 & 2.1977 & 0.6930 \\ 0.0582 & 0.5488 & -0.4170 & -0.3708 \\ -0.1464 & -0.3745 & -0.5436 & 0.2453 \\ -0.1609 & 0.1166 & 0.2857 & 0.5747 \end{bmatrix} \begin{bmatrix} \Delta GDP_{t-2} \\ \Delta trade_{t-2} \\ \Delta credit_{t-2} \\ \Delta volatility_{t-2} \end{bmatrix} \quad (13)$$

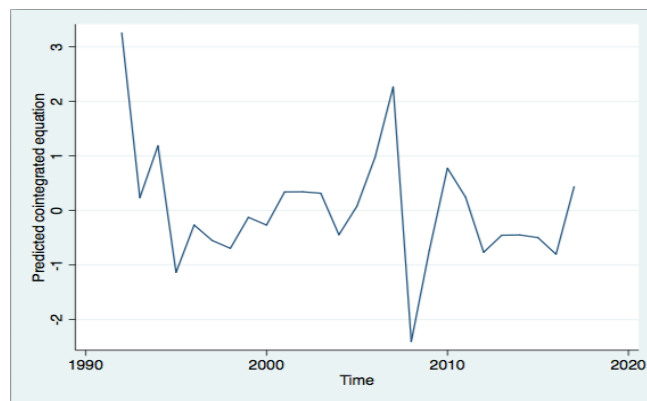
**The VECM estimation for Russian Federation:**

$$\begin{bmatrix} \Delta GDP_t \\ \Delta trade_t \\ \Delta credit_t \\ \Delta volatility_t \end{bmatrix} = \begin{bmatrix} -0.1001 \\ -1.9647 \\ 0.3323 \\ -0.3662 \end{bmatrix} + \begin{bmatrix} 1.8187 & 0.1430 & -3.5780 & -2.7257 \\ -1.7247 & -0.9138 & -0.0782 & 3.5207 \\ 0.3724 & 0.0639 & -0.9935 & -0.2130 \\ 0.3724 & 0.0639 & 0.9935 & -0.2130 \end{bmatrix} \begin{bmatrix} \Delta GDP_{t-1} \\ \Delta trade_{t-1} \\ \Delta credit_{t-1} \\ \Delta volatility_{t-1} \end{bmatrix} + \begin{bmatrix} 0.7629 & 0.1580 & -2.9684 & 0.2257 \\ -0.3753 & -0.2304 & 2.8801 & -0.6306 \\ -0.0805 & -0.0497 & -0.5716 & 0.1211 \\ 0.1487 & 0.1095 & 0.1259 & -0.0523 \end{bmatrix} \begin{bmatrix} \Delta GDP_{t-2} \\ \Delta trade_{t-2} \\ \Delta credit_{t-2} \\ \Delta volatility_{t-2} \end{bmatrix} \quad (14)$$

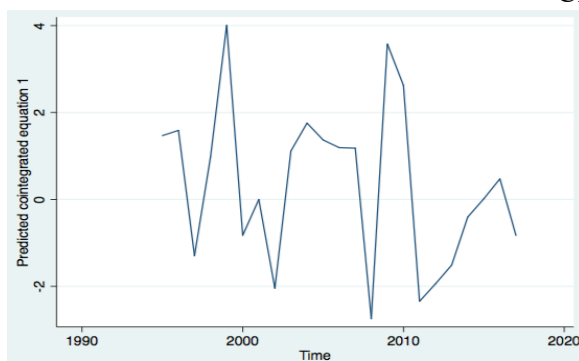
### 3.3 Postestimation Tests

In order to ensure the reliability of our results, we adopted various of postestimation tests. The most important is the specification evaluation of the model, we can check the stationarity of the cointegrating equations for this purpose, since this can decide the inference on the parameters of  $\alpha$  (the adjustment coefficient) to a large extent. From Figure 1, we can see that on a whole, the cointegrating equations of China and South Africa are all stationary if ignoring our limited timespan. In the case of India, the first equation is stationary, but this stationarity is less stable in the second equation compared with that in the first one, which almost fluctuated at around a certain degree before steeply dropping from 2011. However, the downward trend can be observed in both two cointegrating equations of Russian Federation. Additionally, there was a negative trend from nearby 2008 in all countries, which is likely due to the shock of financial crisis of 2008-09.

We can apply the eigenvalues moduli test to further check whether the number of cointegrating equations are determined accurately. Because the companion matrix of a VECM with  $r$  cointegrating vectors and  $K$  endogenous variables has  $K - r$  unit eigenvalues; based on this theory, the moduli of the rest  $r$  eigenvalues are restricted to less than one if the estimation process is operated stably. Table 5 shows the results for the eigenvalue stability test, from which we can ascertain that three moduli of the eigenvalues equal to one in China and two moduli of the eigenvalues equal to one in other three countries, consistent with our selected numbers of cointegrating equations for each country, although there are two moduli of the eigenvalues in India are slightly larger than one ( $K=4$  in all countries, but  $r=1$  in China and  $r=2$  in other countries, leading to " $K - r = 3$ " in China while " $K - 2 = 2$ " in the rest three countries). On the whole, these stability tests do not indicate that our models are misspecified.



China



India (1)



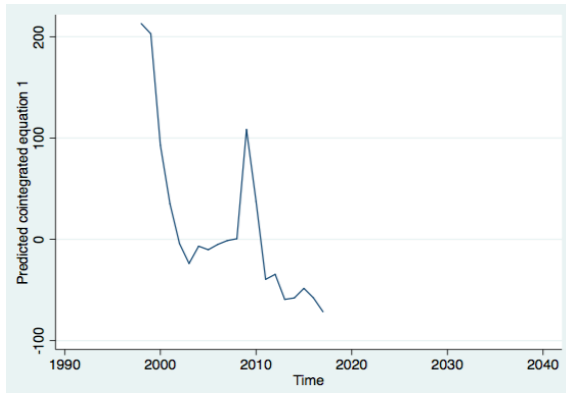
India (2)



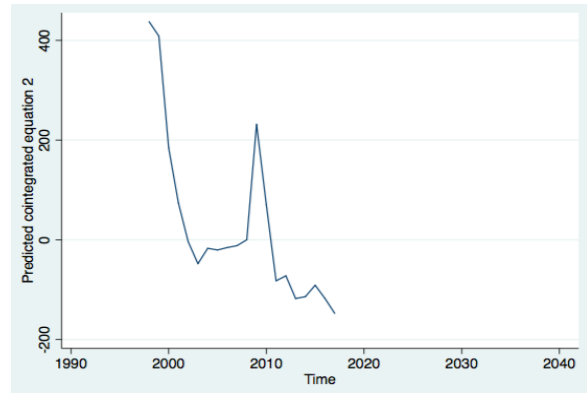
South Africa (1)



South Africa (2)



Russian Federation (1)



Russian Federation (2)

**Figure 1** The Stationarity of the Cointegrating Equations

**Table 5** Eigenvalue Stability Condition

(a) China

Eigenvalue		Modulus
1		1
1		1
1		1
.3360063 +	.7278219i	.801639
.3360063 -	.7278219i	.801639
-.05475618 +	.7943792i	.796264
-.05475618 -	.7943792i	.796264
.6799235 +	.2870537i	.738035
.6799235 -	.2870537i	.738035
-.6880406 +	.2439013i	.729992
-.6880406 -	.2439013i	.729992
.2641812		.264181

(b) India

Eigenvalue		Modulus
.6643877 +	.8413673i	1.07206
.6643877 -	.8413673i	1.07206
1		1
1		1
-.06944943 +	.8639674i	.866754
-.06944943 -	.8639674i	.866754
-.7133481 +	.3691207i	.803191
-.7133481 -	.3691207i	.803191
.7038443 +	.1904218i	.729148
.7038443 -	.1904218i	.729148
-.02603178 +	.5851326i	.585711
-.02603178 -	.5851326i	.585711

## (c) South Africa

Eigenvalue		Modulus
1		1
1		1
.7172468 +	.5515999i	.904823
.7172468 -	.5515999i	.904823
-.6875431 +	.408345i	.799663
-.6875431 -	.408345i	.799663
.2044252 +	.77034i	.797003
.2044252 -	.77034i	.797003
.3646205 +	.6741206i	.766412
.3646205 -	.6741206i	.766412
-.3623727 +	.6503497i	.744492
-.3623727 -	.6503497i	.744492

## (d) Russian Federation

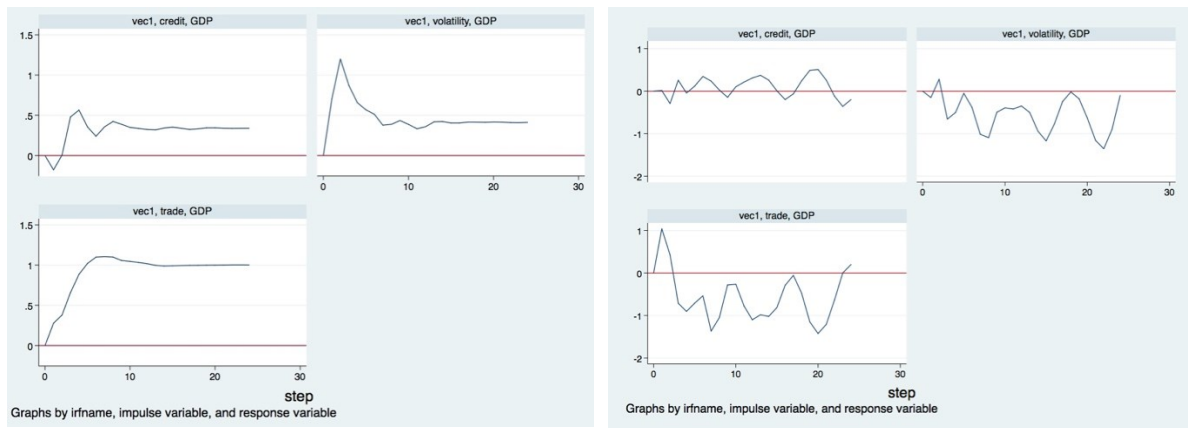
Eigenvalue		Modulus
1		1
1		1
-.2333654 +	.8294178i	.861622
-.2333654 -	.8294178i	.861622
.4808857 +	.6158119i	.781329
.4808857 -	.6158119i	.781329
-.7562015		.756202
.6251115		.625112
-.3283267 +	.453649i	.559996
-.3283267 -	.453649i	.559996
.1659156 +	.2903229i	.334388
.1659156 -	.2903229i	.334388

***Impulse–response functions for VECMs***

By utilizing Impulse–response functions on VECM, we can not only acquire insights of the relationships among variables but also of the lasting time of the effects, which is contrary to VAR, whose time-invariant mean and variance make the effects of a shock disappear and revert to the mean over time. Figure 2 indicates that shocks from *trade*, *credit* as well as *volatility* all have stable and permanent effects on *GDP* in China. The shock from *credit* exerts a slight negative effect on *GDP* before a more noticeable and positive effect appears. As for the shock from *volatility*, there is a sharp soar in *GDP*'s response and then it goes down to a stable level. Similarly, the response of *GDP* to the shock of trade experiences a noticeable growth first, and then keeps at that level onwards.

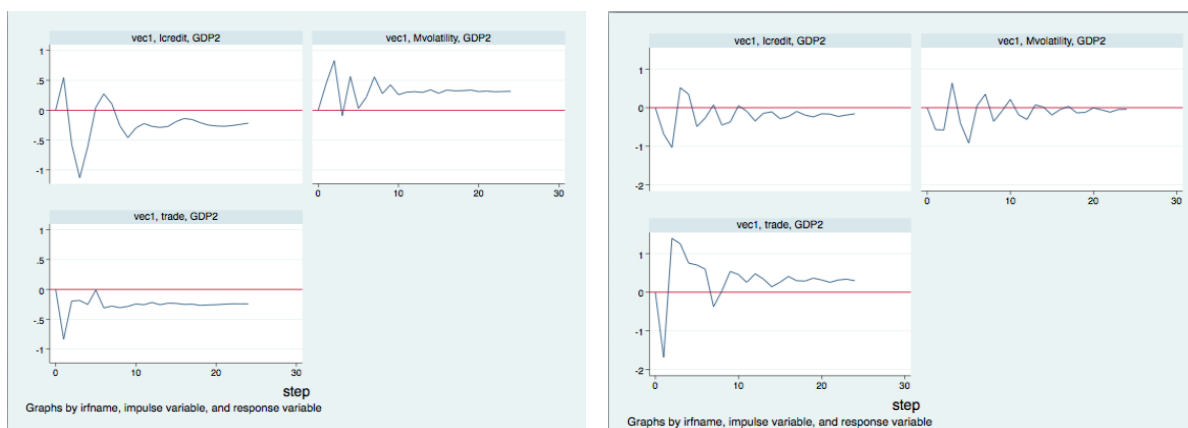
By contrast, the repercussion of shocks from *trade*, *credit* and *volatility* is much more fluctuating in India, there is almost a cyclical change in the response of *GDP* to all these impulses. In the case of South Africa and Russian Federation, the unexpected shocks caused by *trade*, *credit* and *volatility* all bring about permanent effects on *GDP* in the former but become transitory effects in the latter except the influence of *trade*, which has a modest permanent effect on *GDP* in Russian Federation.





China

India



South Africa

Russian Federation

Figure 2 Impulse–response functions

### 3.4 Granger Causality Test

The Granger Causality Test is an efficient approach for examining whether one variable can forecast another, proposed by Granger in 1969. Different from ordinary regressions, which merely reflect correlations among variables, Granger causality test focuses on one time series' ability of predicting another time series' future values. There are two assumptions should be held in this test: 1) the cause happens earlier than the effect (simply, the past and present probably influence the future, but the future cannot influence the past time); 2) the cause contains excluded information about the caused effect happened in the future (Granger, 1969).

If tested variables are stationary, the Granger causality test can be performed in the level values of variables. If they are not, the first (or higher) difference transformation of variables should be applied. A typical method to perform this test is regressing dependent variable both on its own lagged values and on lagged values of the independent variable, and testing the null hypothesis which the estimated coefficients of all lagged values of the explanatory variable are jointly equal to zero, which indicates the explanatory variable fails to Granger-cause the explained variable. Moreover, the number of included lags is generally selected by a certain information criterion, for instance, the Akaike information criterion (AIC) and the Schwarz information criterion (SIC) are generally used for choosing the appropriate number. In addition,

the lagged value of any variable will be kept in the regression when 1) it is significant based on the results of T-test; and 2) it can increase the explanatory power of the specification according to the results of F-test, together with other lagged values of the valuable. In this way, the null hypothesis of no Granger causality exists fails to be rejected only if no lagged values of an independent variable are remained in the regression (Hamilton, 1994; Lütkepohl, 2005).

Adopting Granger causality analysis together with cointegration estimation helps probe the direction of causality among variables, and the multivariate Granger causality test is usually conducted after performing a VAR estimation to the time series variables. The following model shows the VAR model with L time lags for performing Granger causality test:

$$X(t) = \sum_{\tau=1}^L A_{\tau}X(t - \tau) + \mathcal{E}(t) \quad (15)$$

where  $X(t)$  is a d-dimensional multivariate time series, which  $X(t) \in R^{d \times 1}$  for  $t = 1, \dots$ ;  $A_{\tau}$  represents a matrix for each  $\tau$ ; and  $\mathcal{E}(t)$  stands for a white Gaussian random vector. If at least one of the components  $A_{\tau}(j, i)$  for  $\tau = 1, \dots$ , and L is larger than zero with statistical significance, then  $X_i$  can be regarded as a Granger cause of  $X_j$ .

Generally, Granger causality test is efficient to identify the dominant variable, the one acting as a determining factor for another variable, which is particularly favourable to uncover the answer of our research question. We take the first difference transformation to *GDP*, *trade*, *credit* and *volatility*, since they are not stationary in levels but stationary in their first differences, and the results of this test has been displayed in Table 6. From this we can see that, *D\_GDP*, as the focus of this study, is Granger caused by *D\_trade* in four countries except India, since the null hypothesis  $H_0$  (the excluded valuable (*D\_trade*) cannot Granger-cause the dependent variable of this equation (*D\_GDP*)) can be rejected at 5% significance level, and this causality is bidirectional in China and South Africa, meaning that the change in *D\_GDP* can also cause the corresponding difference in *D\_trade*. Moreover, Apart from the *D\_volatility* of South Africa, other variables in all countries have no causality with *D\_GDP*. In the case of *D\_credit*, it is Granger-caused by all other tested variables in China and can also be Granger-caused by *D\_GDP* and *D\_trade* in India, while in South Africa and Russian Federation, there is no causality observed concerning *D\_credit*. Briefly, the bidirectional Granger causality can be detected in China and South Africa, the causality between *GDP* and trade can be found in both countries, while another bidirectional causality which is between *D\_GDP* and *D\_volatility* only appears in the latter. Additionally, there are also unidirectional Granger causality related to *D\_GDP* discovered. For example, *D\_GDP* is acted as one of the factors that can lead to the change in *D\_volatility* in all countries except India, as well as can cause the variation in *D\_credit* in China and India.

**Table 6** Granger Causality Test

Country	Excluded	Chi2	df	P-value	Result (5% significance level) <sup>16</sup>
<b>Equation</b>					
<b>China</b>					
D_GDP	D_trade	7.3959	2	0.025	Reject H <sub>0</sub>
D_GDP	D_credit	0.27832	2	0.870	Accept H <sub>0</sub>
D_GDP	D_volatility	4.9866	2	0.083	Accept H <sub>0</sub>
D_trade	D_GDP	20.851	2	0.000	Reject H <sub>0</sub>
D_trade	D_credit	2.8903	2	0.236	Accept H <sub>0</sub>
D_trade	D_volatility	0.37786	2	0.828	Accept H <sub>0</sub>
D_credit	D_GDP	17.871	2	0.000	Reject H <sub>0</sub>
D_credit	D_trade	10.599	2	0.005	Reject H <sub>0</sub>
D_credit	D_volatility	20.789	2	0.000	Reject H <sub>0</sub>
D_volatility	D_GDP	9.2851	2	0.010	Reject H <sub>0</sub>
D_volatility	D_trade	4.9197	2	0.085	Accept H <sub>0</sub>
D_volatility	D_credit	1.4806	2	0.477	Accept H <sub>0</sub>
<b>India</b>					
D_GDP	D_trade	0.79666	2	0.671	Accept H <sub>0</sub>
D_GDP	D_credit	0.27424	2	0.872	Accept H <sub>0</sub>
D_GDP	D_volatility	0.09008	2	0.956	Accept H <sub>0</sub>
D_trade	D_GDP	2.223	2	0.329	Accept H <sub>0</sub>
D_trade	D_credit	0.43703	2	0.804	Accept H <sub>0</sub>
D_trade	D_volatility	1.2992	2	0.522	Accept H <sub>0</sub>
D_credit	D_GDP	17.701	2	0.000	Reject H <sub>0</sub>
D_credit	D_trade	11.342	2	0.003	Reject H <sub>0</sub>
D_credit	D_volatility	3.5066	2	0.173	Accept H <sub>0</sub>
D_volatility	D_GDP	3.4556	2	0.178	Accept H <sub>0</sub>
D_volatility	D_trade	6.74	2	0.034	Reject H <sub>0</sub>
D_volatility	D_credit	7.8458	2	0.020	Reject H <sub>0</sub>
<b>South Africa</b>					
D_GDP	D_trade	26.051	2	0.000	Reject H <sub>0</sub>
D_GDP	D_credit	2.8324	2	0.243	Accept H <sub>0</sub>
D_GDP	D_volatility	16.791	2	0.000	Reject H <sub>0</sub>
D_trade	D_GDP	9.0585	2	0.011	Reject H <sub>0</sub>
D_trade	D_credit	25.266	2	0.000	Reject H <sub>0</sub>
D_trade	D_volatility	3.4779	2	0.176	Accept H <sub>0</sub>
D_credit	D_GDP	2.6443	2	0.267	Accept H <sub>0</sub>
D_credit	D_trade	1.4663	2	0.480	Accept H <sub>0</sub>
D_credit	D_volatility	4.2036	2	0.122	Accept H <sub>0</sub>

<sup>16</sup> The result is obtained by comparing the P-value with the significance level (5% in this study), we can reject the null hypothesis if the P-value is smaller than 5%, accept it otherwise. For example, the P-value in the first row is 0.025, which is smaller than 0.05, so we reject the null hypothesis.

**Table 6** Granger Causality Test (continued)

Country	Excluded	Chi2	df	P-value	Result (5% significance level)
Equation					
D_volatility	D_GDP	9.4536	2	0.009	Reject H <sub>0</sub>
D_volatility	D_trade	20.964	2	0.000	Reject H <sub>0</sub>
D_volatility	D_credit	0.2924	2	0.864	Accept H <sub>0</sub>
<b>Russian Federation</b>					
D_GDP	D_trade	7.0078	2	0.030	Reject H <sub>0</sub>
D_GDP	D_credit	0.18612	2	0.911	Accept H <sub>0</sub>
D_GDP	D_volatility	0.2885	2	0.866	Accept H <sub>0</sub>
D_trade	D_GDP	1.0702	2	0.586	Accept H <sub>0</sub>
D_trade	D_credit	3.2845	2	0.194	Accept H <sub>0</sub>
D_trade	D_volatility	3.7608	2	0.153	Accept H <sub>0</sub>
D_credit	D_GDP	2.944	2	0.229	Accept H <sub>0</sub>
D_credit	D_trade	0.88963	2	0.641	Accept H <sub>0</sub>
D_credit	D_volatility	2.5535	2	0.279	Accept H <sub>0</sub>
D_volatility	D_GDP	8.9899	2	0.011	Reject H <sub>0</sub>
D_volatility	D_trade	22.277	2	0.000	Reject H <sub>0</sub>
D_volatility	D_credit	0.3424	2	0.843	Accept H <sub>0</sub>

## Chapter IV Discussion

### *China*

Based on the results of VECM estimation, we can conclude that in the case of China, both trade openness and the volatility of financial market negatively affected the GDP growth rate, while the development of financial institutions (*credit*) is positively correlated with economic growth in the long run. Particularly, the change in the percentage of China's total export and import can lead to more noticeable variation in its economic output compared with financial indicators. This finding is also valid in Granger causality test.

From a political perspective, China has always viewed trade as a key factor of boosting its economy. The force to modernize the economy, in other words, being open to the international market, started in 1978, after which, the value of commodity and services flows around the globe began to skyrocket and the efficiency in economic transactions has been largely improved in China, especially with the ensuing desirable economic reforms in the following years. From a closed and comparably centrally-planned system gradually transforming to a more market-oriented one, the international trade of China has been stimulated massively, with more than 38% traded values<sup>17</sup> of GDP in 2018 (World Bank, 2020). This accelerating trade mobilization, indeed, contributes to the explosive growth in China during recent decades, at an annual growth rate of more than 7% from 2013 to 2017, bringing about many benefits, such as prominent progress in poverty reduction and the formation of a more complete and competitive market. However, an increasing number of economists and policymakers began to notice some drawbacks together with this immense trade openness, more precisely, the structure of the international trade. Although China is experiencing high growth rate, the speed of it, in fact, is decreasing. One of the reasons is possibly due to the context of the slowdown in global economy, but more importantly, this is related to its economic policy and orientation. Over these years, China's trade boom has mainly relied on exports with the advantages of its cheaper labor costs and affluent natural resources (China is the main producer and exporter of steel, aluminum and coal), and it keeps fixating the value of the currency (RMB or yuan) at a relatively low level for encouraging the export and achieving balance surplus, which have resulted in the aftermath of declining employment rate, depleting resources and some legal problems concerning environmental protection and Intellectual Property Rights. Specifically, although the general working conditions in China has been improved, the actual size of labor force is shrinking steadily, as shown in the participation rate dropping from 78.8% to 68.2% during 2008-19 (World Bank, 2020). This is partly due to the increasingly fierce job market with additional competition from foreign workers as well as the automation and the adoption of advanced production techniques. By and large, the gains from export-oriented trade strategy have hit a bottleneck currently, and this explains why trade openness of China (in an export-dominant structure) would hinder its economic growth in the long term; thus, the appropriate economic reform about trade policy is necessary. As the largest country in terms of population, China, accounting for nearly one fifth population of the world in total, should utilize this superiority, value and stimulate its domestic demand; and meanwhile, less depend on the exports. In fact, Chinese government has realized the hazard of the long-lasting export-oriented trade flows and began to reevaluate this trade policy. As authorized in "Made in China 2025 plan" by President Xi Jinping, China will further advance and intensify technology development, specifically aircraft engines, clean cars and big data. Furthermore, China has become the world forerunner in the realm of solar technology and it is now cutting down the

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<sup>17</sup> According to the World Bank, Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.

amount of exports (including coal and steel production), such change can also be indicated from the narrowed gap between the amount of exports and imports during recent years.

With regard to internal factors—the development of financial institutions and markets, China’s financial institutions are state-owned and the stability of financial markets is particularly emphasized. The principal financial and fiscal instruments are controlled and executed by the People’s Bank of China (PBOC) and the Ministry of Finance. PBOC, the central bank of China, takes charge of issuing currency and controlling money supply and monitoring other banks, which also serves as the government treasury. Other main banks, such as the “Big Four”, are the Bank of China (BOC), the China Construction Bank (CCB), the Industrial and Commercial Bank of China (ICBC), and the Agricultural Bank of China (ABC), with their own different responsibilities. Precisely, BOC is mainly responsible for trade finance and foreign-exchange transactions; CCB is in charge of overall investment capitalization and capital funds provision; ABC acts as an agricultural sector, providing retail and wholesale banking services to individuals and rural institutions; and ICBC manages daily commercial transactions and serves as a public savings bank, which is the largest bank in China no matter measured by total assets, employees or customers. It is admitted that China’s banking sector is the largest around the world by assets and the “Big Four” occupied the top four of the banking industry in Fortune 500 list 2019, with ICBC ranking the first; nevertheless, China’s banking industry is often accused of its total government-controlled regulation.

It can be inferred that China’s financial transactions and services are strictly controlled by the government. In other words, the yuan’s appreciation or depreciation is related with the state, the interest rates are set by the government and the loans should also be approved by it. It is favorable for state-owned businesses to acquire loans at a low interest rate, but this is, in fact, channeling government funds into large nonprofitable projects; even worse, many of them are likely to be non-performing loans (NPL). As demonstrated by the Wall Street, nearly one-third of China’s economy are constituted by bank loans, and more than 30% of these are possibly the “off-sheet” loans without regulation, which surpass the lending limits specified by the central bank. In this case, these loans are likely to default once the interest rate rises, leading to the countless economic loss and unexpected shocks to the financial market. This is why China’s debt-to-GDP figure has become one of the highest around the world.

Considering China’s distinct financial system and environment, a sound and effective way to expand its economy is attracting more investment in China’s stock market, assisting enterprises to rely less on debts but more on selling stocks, which in the end, contributing to more financial profits. It is conceivable the improvement of China’s current delicate financial system would be advantageous to its GDP growth, and the volatility, such as the sudden decrease in the interest rate, would be detrimental to China’s economy.

### ***India***

Our empirical results show that the financial development of India plays a more significant role in its economic expansion than trade. This is credible since India’s financial market has a long history which can date back to two centuries ago, while the trade liberalization was not proposed until recent decades. The security markets of India have experienced satisfactory progress especially after the country started a series of liberalization policies, afterwards, government controls over financial markets and institutions began to be dismantled since early

1990s, and considerable Initial Public Offerings (IPOs)<sup>18</sup> were launched, resulting in the advent of numerous companies covering various industries. A salient character of Indian economy is the efficient financial markets, which is the main contributor of its total economic output. This is probably because Indian government has long endeavored to improve its financial industry, indicated by the fact that it has tried to usher in a more transparent and integrated market for security trade since the mid 1990s. This is markedly contrasting with other Asian countries, who were either at the initial phase of establishing their financial systems or struggling with some political issues at the same time, such as China.

The financial institutions in India can be categorized into the Reserve Bank of India (RBI: the central bank which mainly regulates the overall development of its banking sector and ensures fiscal stability), the securities and exchange board of India, the credit rating agencies, the commercial banks, and other specialized financial institutions. As for the stock market, most stock transactions are processed on the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). The former was founded in 1875 while the latter started trading since 1994, and both of which follow the same settlement process and trading mechanism (BSE, 2020; NSE, 2020). They are regulated and supervised by RBI and Securities and Exchange Board of India (SEBI), which issue market rules in conformity with efficient market practices (SEBI, 2020). Furthermore, with the better integration of technology into its capital market by Indian world class IT industry, the operational efficiency has been largely improved and has approached the global standard. Gradually, the Indian financial market with the monitoring from the institutions has been structured to be well-developed, efficient, integrated, and the one that is less vulnerable to external shocks, which can be shown from its appraisable performance in handling the economic crisis of 2008-09. As the inflation and confidence collapsed, most countries, even those developed ones were seriously hit by the financial crisis, leading to the sweeping and long-lasting retrogression in their economies. India, on the contrary, quickly recovered from the recession, whose GDP growth rate increased to pre-crisis levels at 6.35% in 2009 and at 7.04% in 2010 (World Bank, 2020). Compared with China, where the external shock critically threatened its domestic market, economic and social stability (because of China's converse economic focus which attached more importance to exports and possessed a more vulnerable financial system), India performed better and was spared from deteriorating bank loans and escalating property issues. This more resilient financial sector with larger portion of private consumption and service is capable to cope with financial shocks. However, other risks also remain due to its less exports and investment. Continuously, India's trade deficit (the difference between imports and exports) keeps widening and has climbed to \$103.63 billion in 2018-19 (World Bank, 2020). This increasing gap, in spite of the positive growth of exports, is due to high domestic demand, such as electrical products, iron and steel. Therefore, several approaches have been taken into account by Indian government in order to improve the trade balance, particularly, the establishment of trade-related infrastructure and the optimization of transportation for exports. These measures will be likely to enhance the role of trade in encouraging Indian GDP growth.

Therefore, considering India's efficient financial sector and the pressure from trade deficit, it is obvious to see that the financial development is more significant in India's economy compared with trade.

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<sup>18</sup> Although it seems that trade openness plays a more important role in China's economy compared with its financial development, China's IPO market develops desirably in recent years despite the slowdown in the world economy. According to the Statista (2019), domestic IPOs in China had rocketed to around 138.7 billion yuan in 2018 (1 yuan equals approximately 0.14 U.S. dollars and 0.13 euros, as of June 2020).

### ***South Africa***

Similarly, there is no direct effect of trade on GDP growth revealed by the cointegrating equation in South Africa, instead, the internal factors seem to be more powerful in explaining its economic growth. Regarding its financial sector, it was initially established mainly for farmers, to whom providing short- and long-run credits since the end of 18<sup>th</sup> century, and the main financial institutions were the Bank van Leening and the Lombard Discount Bank (Odhiambo, 2004). Afterwards, more private banks were founded with the onset of “free banking” era, these unit or “one-office” banks were usually small with limited financial services and expertise. From 1950s, larger and more diversified banks gradually replaced these small-scale ones, such as merchant banks and discount houses, meanwhile, more financial activities and services could be carried out. With the ongoing reforms and regulations, the key components of the financial sector nowadays in South Africa are the Reserve Bank, the commercial banks, discount houses, merchant banks, the stock exchange and the Johannesburg Stock Exchange (JSE, established in 1881, the largest stock exchange market in Africa, which facilitates cash resources to become profitable economic activities). These financial institutions and markets are primary contributors of the total GDP of South Africa, and their contribution experiences a stable and continuous growth. Moreover, there is no government ownership in the banking sector in South Africa, even the Reserve Bank, the monetary authority, which is mainly responsible for inflation control and the protection of the currency’s value (*rand*). It can be implied that the financial development of South Africa was comparably exceptional until the emergence of the new democratic order in 1994, with various unfavorable issues followed, for example, political isolation, the withdrawal of substantial credit lines and international sanctions. This resulted in the drastic devaluation of the *rand*, and the government chose to close the stock and foreign exchange markets in order to curtail the overspreading inflation in South Africa (see South African Reserve Bank, 1997).

After the culmination of the first democratic elections in 1994, this situation was improved. South Africa endeavored to develop its financial markets, rendering better allocation and mobilization of savings to the economy, and the re-entry of an increasing number of foreign-owned security firms, together with the growing assets of their market share. By now, South Africa is considered to possess one of the most developed and complete financial sectors in Africa, especially the financial markets, which contributes more to its economic growth. This can be proved by our study, the larger coefficient of the indicator of financial markets compared with financial institutions and that in other countries (except Russian Federation). Additionally, many existing research are also in favour of this view, pointing out that market-based financial development exerts a more significant growth-enhancing effect in South Africa (See Akinboade and Kinfaek, 2014; Ngare, Nyamongo and Misati, 2014; Nyasha and Odhiambo 2015, 2017).

### ***Russian Federation***

With regard to the predominant factors influencing economic development in Russian Federation, interestingly, although it has two same cointegrating relationships with South Africa, their impact mechanisms are totally opposite with those in South Africa (the reverse signs of the coefficients of all variables). However, whether they are positive or negative effects is not the focus of this study, instead, to uncover whether they make a difference in GDP growth and this difference is to what extent are our targets. Thus, we can reach a preliminary conclusion that financial development is more crucial for economic growth in Russian Federation during the observed period. The high dependence on the financial market can be linked with Russian transition from a centrally-planned to a market-based economy since the



collapse of communism in 1990s. During this period, the establishment of various of commercial and institutional entities, especially banks, private property, trading systems and exchange markets, were vigorously encouraged. Although Russian economy suffered from numerous shocks, especially to its financial sector (the collapse of the financial “pyramid” in 1994, Ruble crisis in 1998 and global financial crisis in 2008), it quickly recovered and began to increase at a rapid pace, and now Russian Federation has become the fifth largest economy in Europe (Lakovlev and Danilov, 1997).

However, it is criticized that financial institutions (banks) do not contribute much to Russian economic growth, indicated by its excessive loans to the economy (Ono, 2017), while the development of financial markets plays a more significant role in economic rehabilitation. More specifically, the initial phase of Russian financial market started from the emergence of the Moscow Interbank Currency Exchange (MICEX, allowed to be accessed from 1992) which becomes the primary platform for currency transactions in Russian Federation nowadays. Other causes stimulating the expansion of its financial market can be linked with the privatization process of Russia. From 1993, the limitation of state-securities vouchers created conditions for the formation of the stock market, and the development of the interbank credit market at the end of 1993 strengthened the status of financial markets in Russian financial sector. Over the following years, the whole financial market has become more complete and efficient with the growing influx of foreign portfolio investment and favorable structural changes, and such improvement is still ongoing. For example, MICEX is paying efforts to optimize Russian stock market, which merged with Russian Trading System in 2011. The merger aims to facilitate Russian financial development and turn Moscow into an international and integrated financial center. By contrast, the development of financial institutions seems to be less-motivated and this further accentuates the more principal role of financial markets in improving Russian economy.

In a word, based on our empirical results, we find that the dominant influential causes of economic growth are diverse in China, India, South Africa and Russian Federation. In the case of China, the external factor—— trade openness exerts a more significant effect on GDP growth than the internal factor—— financial development, although such effect is negative in the long run. This is because China has relied on the export-oriented trade for decades, making it more vulnerable to external shocks especially during the global crisis or recession; meanwhile, many profits brought by exports are based on the cost of environment, which in turn, will hinder economic growth in the long term (Tang et al., 2016; Gill et al., 2017; Abdouli and Hammami, 2018). Additionally, the over-emphasis of trade can cause the relatively negligence of financial development, which partly explains the less influence contributed by financial institutions and markets on economic development in China compared with other countries. Specifically, the development of financial institutions and markets play more significant roles in the economic upturn of India, South Africa and Russian Federation, and such influence can be noticed not only on GDP growth but also on aggregate trade volumes. This is because the financial sector has been more valued in these countries, and related financial services, markets and institutions appeared relatively earlier than those in China.

The fact that the affecting power of different variables are diverse in these countries is plausible, if we take their national policies, history and the focus of the development strategies into consideration, and we identify that the weightings of trade and financial development are related to these factors. In general, a factor would be more influential to a country’s economic growth if it attaches more importance to this factor and vice versa.

## Chapter V Conclusion

As the escalating trade tensions and prevalent policy uncertainty, the world economy has experienced an extensive slowdown, accompanied with shrinking global investment, the hindered poverty eradication progress and intensified financial instability. For example, elevated debt levels, which not only poses a threat themselves but also negatively influences a country's resilience to external shocks, resulting in continuous financial fragility in economic activities when there is a further deterioration. At the same time, the economic development still displays a desirable high growth rate in emerging economies, particularly emerging Asia, at 6.3% in 2019, which almost tripled the global pace (around 2.3%), whereas many countries are suffering from extensive deceleration (OECD, 2019a).

Therefore, considering this notable economic expansion in emerging economies as well as the downturn in global economy, this thesis aims to inspect the principal factors which can significantly affect economic growth in emerging markets. We start from comparing a number of potential economic factors and dividing them into external and internal two groups. Based on the preliminary analysis and previous research, this study selects three typical and the most influential factors, trade indicator for the external group, financial markets and institutions indicators for the internal group. In view of the validity and value of the results, this paper exploits VECM technique and Granger causality test to explore the long-term relationships among these variables, which avoids spurious regression problems and Engle-Granger 2-step method's limitations (Park and Phillips, 1988; Sims, Stock, and Watson, 1990; Stock (1987); Stock and Watson (1988); Hubrich, Lütkepohl, and Saikkonen (2001).

Utilizing the data of China, India, South Africa and Russian Federation, this thesis find that: 1) there is only one long-term equilibrium among GDP growth, trade and financial development in China, while two types of long-run relationships can be observed in the rest countries; 2) in the case of China, trade openness plays a more significant role in explaining its economic output than financial development, but this role exerts a negative effect in the long run; 3) regarding India, South Africa and Russian Federation, the development of financial markets and institutions are more dominant factors in their economies, which also influence their trade volumes; 4) the short-term relationships among these factors are less significant in all countries compared with long-term relationships; 5) based on the results of Granger causality test, there is bidirectional causality between trade openness and GDP growth in China and Russian Federation, while another bidirectional causality between financial markets and GDP growth can also be explored in the latter.

These findings are reasonable and convincing when taking these countries' policies, history, and particularly, the focus of their development strategies. To be more specific, the more influential power of international trade in economic development in China than that in other countries is closely related with China's trade-oriented development strategy. Since 1978, China turned from "closed-door policy" which strictly limited business with other countries, into "open-door policy" which is in favor of trade liberalization. This change leads to the conspicuous increase<sup>19</sup> in China's international trade flows in terms of the value of commodity and services, with the total exports and imports soaring from less than 10% to nearly 40% of GDP (World Bank, 2020). Such climbing international transaction value, to a large extent, contributes to the continuous growth in China during recent decades, at the annual growth rate

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<sup>19</sup> In spite of the increasing trend in China's international trade value, some decreases can also be observed since 1978, this is probably due to the volatility accompanied with the transformation of its trade policy.

of more than 7% from 2013 to 2017, accompanied with various benefits, such as prominent progress in poverty reduction and the formation of a more complete and competitive market. This trade-oriented economic policy, however, is export-dominated. With the advantage of affluent nature resources and cheap labor costs, China has become the main exporter of many important raw materials, such as steel and aluminum, as well as the “the world’s factor”, although this status is at the cost of nature. According to Tang et al. (2016), Gill et al.(2017), Abdouli and Hammami (2018), the massive environmental cost cannot be balanced or absorbed by the resource intensive growth strategy, and the deteriorating environment not only threatens to human’s survival, but also hinders economic growth and sustainable development in the long run. Therefore, it is conceivable to observe the negative relationship between trade openness, more precisely, the export-dominated trade strategy, and GDP growth in China in the long term. Moreover, over-relying on exports makes China relatively more vulnerable to external shocks especially during the global recession; it seems that the current downturn in world’s economy will prolong, causing more decrease in China’s export transactions, which in turn will affect its economic growth as well.

With regard to India, South Africa and Russian Federation, the development of financial markets and institutions (though some of them still need further development) plays a more significant role in economic growth than international trade, and this factor can also explain the variation in the total trade volume. Compared with China, these three countries have longer history of financial development, and they have long endeavored to develop the financial sector. For example, there have been considerable IPOs launched since early 1990s in India, mainly due to the repeal of government controls over financial markets and institutions; during the same period, India has tried to establish a more transparent and integrated market for the security trade, while China was still struggling with some domestic political issues. It is the emphasis of financial development that facilitates it, especially Indian financial markets, to become well-developed and efficient, and the one which is highly resilient to external shocks. During the economic crisis of 2008-09, while many countries, even those developed ones were seriously influenced by the crisis and suffered from sweeping and severe retrogression in their economies. Indian, by contrast, quickly recovered from the recession, whose GDP growth rate increased to pre-crisis levels at 6.35% in 2009 and at 7.04% in 2010 (World Bank, 2020). Compared with China, where the external shock critically threatened to its domestic market, economic and social stability (because of its export-dominated economic policy and relatively more vulnerable financial system), India performed better and was spared from deteriorating bank loans and escalating property issues. Similarly, the financial development has been more valued in South Africa and Russian Federation, and it is more efficient in stimulating their economic growth. It is said that South Africa is considered to possess one of the most developed and complete financial sectors in Africa, especially the financial markets, which contributes more to its economic growth. This is consistent with previous research which maintain that the market-dominated financial structure is more beneficial and powerful than the bank-based one in stimulating economy in South Africa (See Akinboade and Kinfack, 2014; Ngare, Nyamongo and Misati, 2014; Nyasha and Odhiambo 2015, 2017). As for Russian Federation, the development of financial institutions also seems to be less-motivated, and financial markets are believed to be a major contributor of Russian economy, which is credible in view of its market-based economy. Therefore, it can be concluded that the primary influential factors of economic growth are different in countries with diverse economic policies, history and the most importantly, the focus of their development strategies. In general, a factor would be more powerful to affect economic development in a country if it attaches more importance to this factor and vice versa.

Based on these findings, some policy implications can be drawn as follows:

- 1) For countries which have relied on export for a long time, such as China, it is favourable for them to reassess their trade structures, and transfer the focus to financial development, since long-time export-oriented strategy is disadvantageous to a country's sustainable development, and also the negligence or total state control of the financial sector could make it more vulnerable to external shocks. It is suggested to exploit domestic demand and pay more attention to internal factors, especially for China (the most populous country in the world), which benefits boosting the domestic market as well as improving the export-dependent trade structure.
- 2) For countries mainly focusing on internal factors and relying on imports, such as India, which possesses a well-developed and resilient financial sector but with the trade deficit problem, it is beneficial for them to keep the advantages of their efficient financial systems; but at the same time, utilize their strengths, they are telecommunication, automotive and pharmaceutical industries in India's case, to expand exports which can relieve the pressure from trade deficit.
- 3) For those relatively lagged-behind countries but with high growth rate and considerable FDI, such as South Africa in this study, it is recommended to try to keep a high speed in GDP growth, and then exploit the asset and positive spillover effects from FDI, for example, the advance in terms of technology and productivity, to develop their own native economies and competitive industries, which can be utilized to expand exports in the end.
- 4) For a transition economy, such as Russian Federation, it is advised to attach the importance to political stability by facilitating the transition and settling the dispute among institutions. Because a country's stability is a key factor for economic development, and a stable economic and political environment benefits the country to achieve better economic results especially from some economic activities which needs institutions' involvement, such as banks. This would stimulate more contributions to economic growth from financial institutions in Russian Federation.

However, some limitations also exist in this thesis, one of them is the limited observed period. Due to data availability of financial indicators and the short history of financial development in certain countries, the applied period covered by this empirical research is not quite long; therefore, future research can work on this topic by investigating other countries with bigger dataset. In addition, this dissertation mainly focuses on the effects of economic-related factors on economic growth, other endogenous factors, such as the law system, technology and environment are not included in the empirical process; thus, future research could provide more insights on the relationships between these factors and economic development. Besides, due to the attributes of statistical studies, the change in political powers caused by the shift in economic structures may not be covered in depth; considering this, other investigations could further explore the political effects led by the adjustment of the focus in trade openness or financial development, or more specifically, the change in the financial structure (a market-based or bank-based economy).

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## Appendices

### Appendix 1: The Results of the VECM Estimation

(a) China

Error Correction	D(GDP)	D(trade)	D(credit)	D(volatility)
CointEq	-2.764809***	1.133217	0.4300382	-0.7048861
D(GDP(-1))	[0.7068162] 1.568754***	[2.608706] 0.539709	[1.673766] -1.081191	[5.815265] 3.030527
D(GDP(-2))	[0.4912136] 0.3352931	[1.812963] -2.418849	[1.163211] 0.951578	[4.041414] 4.977525
D(trade(-1))	[0.367854] -0.0849803	[1.35767]* 0.591843	[0.8710912] -0.3868202	[3.026485] -0.9931296
D(trade(-2))	[0.1045512] 0.0446282	[0.3858759] 0.4622975	[0.2475809] -0.0916763	0.8601854 0.4047017
D(credit(-1))	[0.0641152] -0.0134888	[0.2366352]* 0.4077615	[0.151827] 0.8466482***	[0.5275016] 0.593148
D(credit(-2))	[0.0914131] -0.060809	[0.3373861] -0.0781933	[0.2164695] -0.4886372***	[0.752093] -0.5113755
D(volatility(-1))	[0.0717608] -0.0796603	[0.2648537] 0.1133684	[0.1699322] -0.0596587	[0.5904057] -0.334336
D(volatility(-2))	[0.0498187] 0.0173515	[0.1838702] 0.0149672	[0.1179725] -0.1920275***	[0.409879] 0.0505615
C	[0.0244594] -0.032928	[0.0902742] -1.269422	[0.0579206] 1.593482**	[0.2012371] -0.9394902
R-squared	[0.3088465] 0.6898	[1.139886] 0.6240	[0.7313593] 0.9033	[2.541006] 0.4888
Log likelihood	-186.6242			
AIC	19.96732			
HQIC	20.50122			
SBIC	22.0902			

D(GDP(-1)), D(trade (-1)), D(credit(-1)) and D(volatility(-1)) denote the variables in first difference

D(GDP(-2)), D(trade (-2)), D(credit(-2)) and D(volatility(-2)) denote the variables in second differences

C denotes the constant

\*\*\*, \*\* and \* denote 1%, 5% and 10% significance levels, respectively

[ ] denoted the value for the standard value

AIC: Akaike information criterion

HQIC: Hannan–Quinn information criterion

SBIC: Bayesian information criterion

(b) India

Error Correction	D(GDP)	D(trade)	D(credit)	D(volatility)
CointEq1	-1.965372***	2.572688**	0.7539898***	0.0504055
	[0.5269141]	[1.172713]	[0.2436436]	[1.526624]
CointEq2	-0.1634304***	-0.0844969	0.191265**	1.232918**
	[0.1871423]	[0.4165085]	[0.086534]	[0.5422058]
D(GDP(-1))	0.8214638*	-1.051992	-0.2846735	1.676996
	[0.4676879]	[1.040898]	[0.2162575]	[1.355028]
D(GDP(-2))	0.1588137	-0.5290626	0.0897661	-1.166317
	[0.3346516]	[0.7448091]	[0.1547419]	[0.9695835]
D(trade(-1))	0.418756*	0.2620044	-0.0429053	-0.9578893
	[0.2454371]	[0.546251]	[0.1134894]	[0.7111029]
D(trade(-2))	0.3217302	0.2310425	-0.0737364	-2.834204***
	[0.3429621]	[0.7633051]	[0.1585847]	[0.9936614]
D(credit(-1))	-0.3205049	-0.8314974	0.0156111	6.915783***
	[0.8344208]	[1.857108]	[0.3858337]	[2.417561]
D(credit(-2))	-0.5968265	0.3308444	0.5242305**	-0.4720378
	[0.4610111]	[1.026038]	[0.2131702]	[1.335684]
D(volatility(-1))	0.1704715*	-0.3528513	-0.0847117*	0.7319072**
	[0.1004006]	[0.223454]	[0.0464249]	[0.2908897]
D(volatility(-2))	0.2098391**	-0.127974	-0.029242	-0.4681488*
	[0.0959061]	[0.213451]	[0.0443467]	[0.277868]
C	0.566153	0.045568	1.328825**	-0.1279733
	[1.303183]	[2.900398]	[0.6025881]	[3.775703]
R-squared	0.7652	0.6259	0.9312	0.7003
Log likelihood		-133.5339		
AIC		18.15339		
HQIC		18.61989		
SBIC		20.54314		

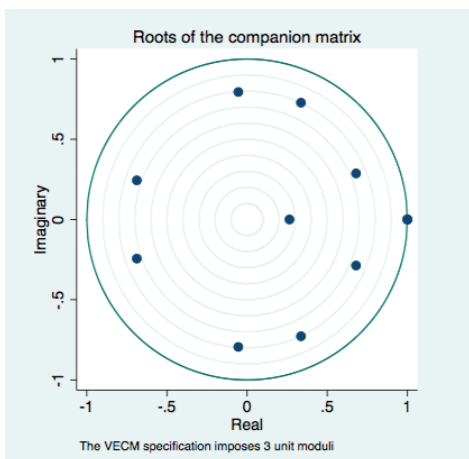
## (c) South Africa

Error Correction	D(GDP)	D(trade)	D(credit)	D(volatility)
CointEq1	0.2807172	4.825358***	-0.9600959	0.8752621
	[0.3831467]	[0.7096421]	[2.816879]	[0.883923]
CointEq2	-0.2940749	-2.693641***	0.868217	0.1463322
	[0.1949026]	[0.3609873]	[1.432916]	[0.4496421]
D(GDP(-1))	0.3062689	-3.16318***	1.82067	-2.893396**
	[0.5318212]	[0.9850084]	[3.909928]	[1.226916]
D(GDP(-2))	-0.2647114	-1.994126***	2.197678	0.6930378
	[0.267695]	[0.4958093]	[1.968083]	[0.617575]
D(trade(-1))	-0.0538234	0.6852528***	-0.3489418	0.3283422
	[0.1213332]	[0.2247264]	[0.8920372]	[0.2799169]
D(trade(-2))	0.0581521	0.5488339***	-0.4169884	-0.370757**
	[0.0738371]	[0.1367567]	[0.5428471]	[0.1703428]
D(credit(-1))	-0.035314	-0.4767432***	0.8390269	-0.0747086
	[0.0893521]	[0.1654929]	[0.6569134]	[0.2061362]
D(credit(-2))	-0.1464155**	-.3745005***	-0.5435882	0.2452606
	[0.0652218]	[0.1208]	[0.479508]	[0.1504673]
D(volatility(-1))	0.2009353**	-0.1828986	0.7939478	-0.0685573
	[0.0852188]	[0.1578373]	[0.626525]	[0.1966005]
D(volatility(-2))	-0.1609297*	0.116625	0.2857004	0.5746955**
	[0.0878341]	[0.1626812]	[0.6457527]	[0.2026341]
C	0.3500391	0.5853813	2.10786	-1.02734**
	[0.2231695]	[0.4133417]	1.640733	[0.5148542]
R-squared	0.9230	0.9725	0.6217	0.9346
Log likelihood			-120.542	
AIC			17.74127	
HQIC			18.14506	
SBIC			20.12722	

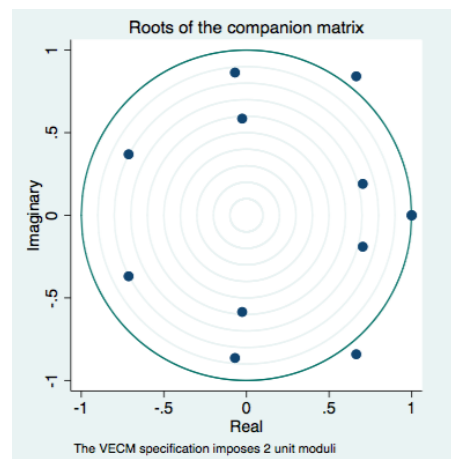
## (d) Russian Federation

Error Correction	D(GDP)	D(trade)	D(credit)	D(volatility)
CointEq1	-3.008466***	-0.4033619	0.6826776	3.605991
	[0.978861]	[0.6592725]	[2.64058]	[3.170594]
CointEq2	1.484981***	0.1843649	-0.4607867	-1.813231
	[0.4832303]	[0.3254604]	[1.303564]	[1.565214]
D(GDP(-1))	1.818692**	0.1429844	-3.578002*	-2.725701
	[0.7728264]	[0.5205062]	[2.08478]	[2.503235]
D(GDP(-2))	0.7628975	0.1579892	-2.968419*	0.2256816
	[0.6108146]	[0.4113897]	[1.647736]	[1.978468]
D(trade(-1))	-1.724109***	-0.9138271**	-0.078202	3.520682*
	[0.6467672]	[0.4356041]	[1.744722]	[2.094921]
D(trade(-2))	-0.3753302	-0.2303501	2.880065**	-0.6305542
	[0.5336922]	[0.359447]	[1.43969]	[1.728664]
D(credit(-1))	0.0199948	0.0556981	-0.0668473	-0.1629935
	[0.1202439]	[0.0809854]	[0.3243704]	[0.3894777]
D(credit(-2))	-0.0805153	-0.0496667	-0.5716276*	0.1210901
	[0.1199815]	[0.0808087]	[0.3236627]	[0.3886279]
D(volatility(-1))	0.3724049**	0.0638774	-0.9935449**	-0.2130038
	[0.1742567]	[0.1173636]	[0.4700757]	[0.5644288]
D(volatility(-2))	0.1487181	0.1095008	0.1258929	-0.052292
	[0.1510882]	[0.1017594]	[0.4075761]	[0.4893844]
C	-0.1000622	-1.96473**	0.3323198	-0.366168
	[1.382614]	[0.9312044]	[3.729747]	[4.478377]
R-squared	0.8287	0.7557	0.7515	0.7191
Log likelihood		-143.0972		
AIC		22.48203		
HQIC		22.71588		
SBIC		24.83463		

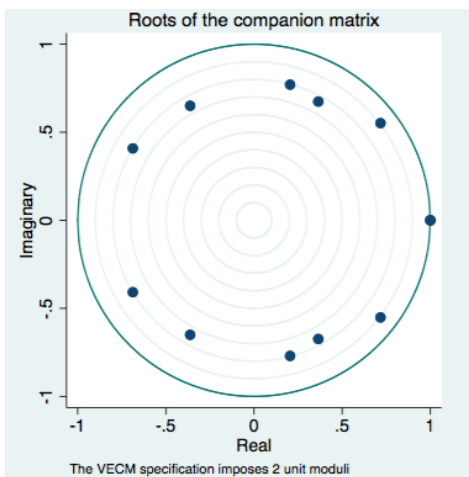
## Appendix 2: Unit Eigenvalues Test



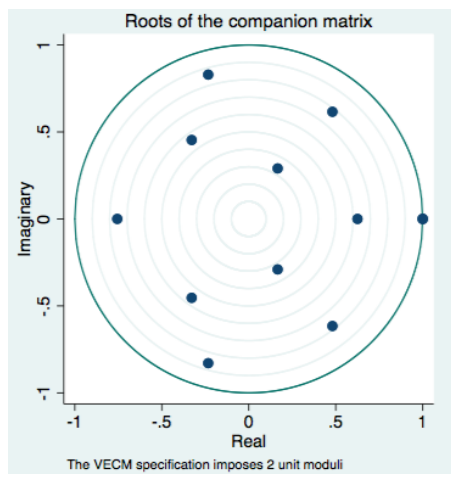
China



India



South Africa



Russian Federation