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Viet Nam Institute for Economic and Policy Research, formerly known as Viet Nam Center for Economic and Policy Research was established on July 7, 2008. On August 26, 2014, Viet Nam Institute for Economic and Policy Research was established on the foundation of Viet Nam Center for Economic and Policy Research, keeping the same abbreviation as VEPR. After 10 years of development, on February 12, 2018, VEPR was officially recognized as the Center of Excellence of Vietnam National University.

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CONTACT US

Viet Nam Institute for Economic and Policy Research (VEPR)
University of Economics and Business, Viet Nam National University, Ha Noi
Address: Room 707, E4 Building
144 Xuan Thuy strt, Cau Giay dist
Ha Noi, Viet Nam
Tel: (84-24) 3 754 7506 - 704/714
Fax: (84-24) 3 754 9921
Email: info@vepr.org.vn
Website: www.vepr.org.vn

VIET NAM ANNUAL ECONOMIC REPORT 2019

ON THE DOORSTEP TO THE DIGITAL ECONOMY

Edited by Nguyen Duc Thanh & Nguyen Cam Nhung

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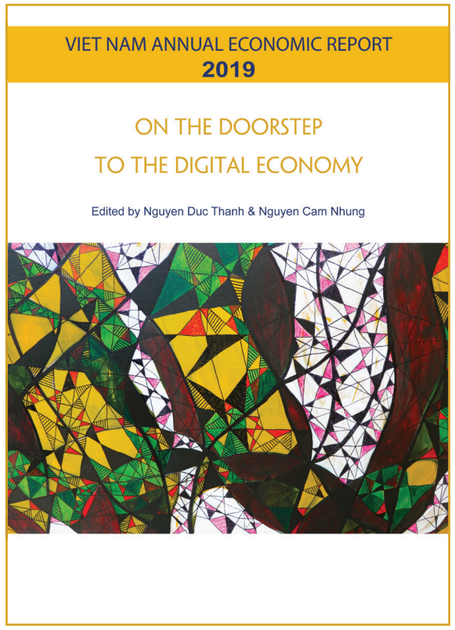

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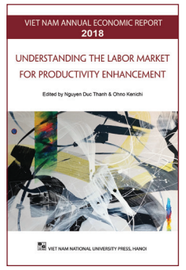

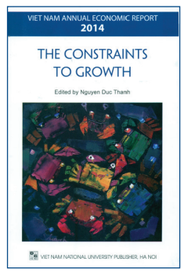

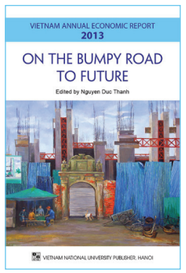

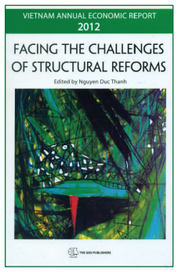

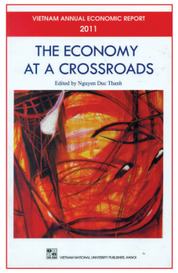

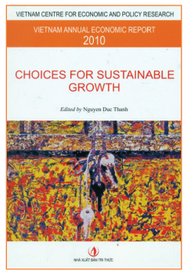

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LAUNCHING CONFERENCE AGENDA

VIETNAM ANNUAL ECONOMIC REPORT 2019

ON THE DOORSTEP TO THE DIGITAL ECONOMY

Time: Wednesday, 29 May, 2019

Venue: Sheraton Hotel, 11 Quang An Street, Hanoi

08h00 – 08h30 Registration

08h30 – 08h35 Welcome and Introduction

08h35 – 08h50 Opening Remarks

Assoc.Prof.Dr. Nguyen Truc Le, Rector, VNU University of Economics and Business (VNU – UEB)

Remarks by Representatives from Friedrich Naumann Foundation, Vietnam

08h50 – 09h30 Presentation on the main contents of the Vietnam Annual Economic Report

Assoc.Prof.Dr. Nguyen Duc Thanh, President of VEPR

09h30 – 10h15 Comments from Experts

10h15 – 10h30 Tea break

10h30 – 11h35 Open discussion

Co-chair:

Assoc.Prof.Dr. Nguyen Truc Le, Rector, VNU University of Economics and Business

Assoc.Prof.Dr. Nguyen Duc Thanh, President of VEPR

11h55 – 12h00 Closing Statement by the Rector of VNU - UEB

12h00 – 13h00 Luncheon at the hotel

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VIET NAM ANNUAL ECONOMIC REPORT 2019

Editors:

Assoc. Prof. Nguyen Duc Thanh and Dr. Nguyen Cam Nhung

ON THE DOORSTEP TO THE DIGITAL ECONOMY

HA NOI, 5/2019

ON THE DOORSTEP
TO THE DIGITAL ECONOMY

Vietnam Annual Economic Report 2019

ON THE DOORSTEP TO THE DIGITAL ECONOMY

Contact:

Viet Nam Institute for Economic and Policy Research (VEPR)

University of Economics and Business, Viet Nam National University, Ha Noi

Address: Room 707, E4 Building, 144 Xuan Thuy street, Cau Giay district, Cau Giay, Viet Nam

Tel: (84) 4 37547506 (ext 704)

Fax: (84) 4 37549921

Email: info@vepr.org.vn

Website: www.vepr.org.vn

Cover image: *The rhythm of the Ocean 02* (extract) by artist Nguyen Chi Long (2018, *Acrylic on canvas*, 100x100 cm), collection of NĐT.

ABOUT VEPR

VIET NAM INSTITUTE FOR ECONOMIC AND POLICY (VEPR), formerly known as Viet Nam Centre for Economic and Policy Research, was established on July 7, 2008 as a research centre under the University of Economics and Business, VNU. VEPR has legal status and is headquartered at the University of Economics and Business, Xuan Thuy, Cau Giay, Ha Noi.

VEPR considers its primary mission to be carrying out economic and policy research to assist in improving the decision-making quality of policy-making institutions, enterprises, and interest groups by providing insights into the social, political, and economic factors that drive the economic affairs of Viet Nam and the region. The main activities of VEPR include (i) providing quantitative and qualitative analysis of changing economic conditions in Viet Nam and assessing their impacts on various interest groups throughout the country, (ii) organizing policy dialogues among policy-makers, entrepreneurs, and other stakeholders to improve solutions to emerging issues, and (iii) conducting advanced training courses in economics, finance and policy analysis regularly and upon request.

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According to the *2019 Global Go To Think Tank Index Report* conducted by the University of Pennsylvania, VEPR was ranked 59th among top 100 think tanks in the Southest Asia and the Pacific.

CONTRIBUTORS

(According to alphabetical order)

Assoc. Prof. Dr. Pham The Anh: MSc and PhD in Economics at The University of Manchester in 2003 and 2007 respectively. He is a senior lecturer in Macroeconomics at the National Economics University cum Chief Economist at Thang Long Securities Company. Dr. Pham also takes charge of chief economist of VEPR now.

Jessica Atherton: Bachelor of Psychology with Class I Honours (2016); Rotary Youth Leadership Award recipient (2014); CSIRO Summer Research Scholar (2015); Research Assistant at Griffith University (2016-2018); Research Analyst on CSIRO's Data61 Insight Team (2018-now).

Dr. Lucy Cameron: PhD in Social Science from the University of Queensland (2007); Smithsonian Fellow (2015); former Manager and Principle Policy Officer of Digital Economy and Productivity Unit in the Queensland Government (2005-2016); currently Senior Research Consultant CSIRO's Data61 Insights Team.

Shashi Kant Prasad Chaudhary: Programme Leader in International Business Administration in British University Vietnam since 2014. Mr. Chaudhary is also a doctoral candidate at University of Economics and Business, VNU.

Ha Thi Diu: Bachelor of Economics at National Economics University and Researcher of Macroeconomic Research Team, VEPR

Dr. Tran Viet Dung: She received Master Degree in Economics from University of Queensland, Australia and Doctoral Degree in International Economics from University of Economics and Business, VNU. At present, she works as a lecture at the Faculty of International Business and Economics, University of Economics and Business, VNU.

Assoc. Prof. Dr. Nguyen Viet Khoi: Bachelor of Economics at VNU; MBA at CGFV; PhD in Economics at Vietnam Academy of Social Science; Research Fellow at University of Wisconsin and Columbia University.

Dr. Pham Thu Hien: PhD in Economics from the University of Queensland (2016); former officer in Foreign Economic Relations Department of Ministry of Planning and Investment, Vietnam (2004-2012); former lecturer in the University of Queensland (2016-2017); currently postdoc fellow in CSIRO's Data61 Insights Team.

Nguyen Duc Hieu: Bachelor of Applied Mathematics at National Economics University and currently Reseacher at 4.0 Team, VEPR

Dr. Vu Thanh Huong: She received Master Degree in Natural Resource Economics from University of Queensland, Australia and Doctoral Degree in International Economics from University of Economics and Business, VNU. At present, she works as a Deputy Head of the Department of World Economy and International Economic Relations, the Faculty of International Business and Economics, University of Economics and Business, VNU.

MSc. Bui Ha Linh: Bachelor of International Economics at Foreign Trade University; MSc in Development Economics at the Unversity of Manchester and Researcher of Macroeconomic Research Team.

Bui Thi Thuy Linh: Bachelor of Invetsment Economics at National Economics University and currently Reseacher at 4.0 Team, VEPR

Dr. Nguyen Cam Nhung: She earned Master Degree in International Economics, PhD in Economics from the National University of Yokohama. She works as a lecturer and Vice Dean of Faculty of International Business and Economics, University of Economics and Business at VNU. She is also an research fellow at VEPR.

MSc. Nguyen Thu Nga: MSc in Applied Economic: Business Administration at University of Antwerp - Belgium; Project manager and coordinator for development projects in VEPR,

Assoc. Prof. Dr. Nguyen Duc Thanh: PhD in Development Economics from the National Graduate Institute for Policy Studies (GRIPS), Japan; Associate Professor of the University of Economics and Business, VNU; member of the Macroeconomic Advisory Group (MAG) of the National Assembly's Economic Committee; member of the Macroeconomic Advisory Group for the Prime Minister; and President of VEPR.

BOARD OF ADVISORS AND COMMENTATORS

(According to alphabetical order)

Dr. Nguyen Dinh Cung (President, Central Institute for Economic Management)

Dr. Le Dang Doanh (Senior Economic Expert, Former President of Central Institute for Economic Management, member of the United Nations' Committee for Development Policy)

Dr. Le Hong Giang (Director of Foreign Exchange Fund, Tactical Global Management)

Assoc. Prof. Dr. Phi Manh Hong (Lecturer of Faculty of Development Economics, University of Economics and Business, VNU)

Mrs. Pham Chi Lan (Senior Economic Expert, Former Vice Chairman of Viet Nam Chamber of Commerce and Industry)

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Dr. Dinh Quang Ty (Academic Fellow of Viet Nam Communist Party's Central Theoretical Council)

EDITING TEAM

Nguyen Duc Thanh

Dang Thi Bich Thao

Nguyen Cam Nhung

Tran Long Duc

Hoang Thi Chinh Thon

Bui Ha Linh

Nguyen Duc Hieu

Ha Thi Diu

ACKNOWLEGEMENT

Viet Nam Annual Economic Report 2019 by the Viet Nam Institute for Economic and Policy Research, University of Economics and Business, VNU was made possible with the support from many individuals and organizations.

First and foremost, the authors would like to express gratitude to Viet Nam National University's Board of Presidents in Ha Noi and the Board of Directors of University of Economics and Business; and those who have encouraged and enthusiastically supported the authors during the last seven years of conducting the Report series.

One of the most important contributions that must be mentioned is from the ***Board of Advisors and Commentators***, who have participated in many discussions, workshops, and seminars during different stages of the *Report*. Thanks are due to Dr. Vo Tri Thanh, Assoc. Prof. Dr. Nguyen Anh Thu, Assoc. Prof. Dr. Phi Manh Hong and Mr. Dinh Tuan Minh for their deep analyses and constructive feedback on each chapter of the *Report*.

We are grateful to the the Friedrich Naumann Foundation (FNF), Viet Nam for their generous support and fruitful cooperation in various aspects, especialy the sponsorship for the Conference launching this *Report* on May 2019.

We are greatly helped by VEPR staffs, especially the ***Editing Team***. Their enthusiasm, dedication, and persistence are an indispensable part of this Report.

We would like to express our gratitude to the members of the Department of Science and Technology at VNU in Ha Noi, and the Department for Research and International Relations at the University of Economics and Business for their enthusiastic support during the project.

Despite our efforts, we understand that there may be limitations and even errors in the *Report*. We sincerely hope to receive comments and contributions from the readers to improve our upcoming reports.

Ha Noi, May 29, 2019

On behalf of the Contributors

Assoc. Prof. Dr. Nguyen Duc Thanh and Dr. Nguyen Cam Nhung

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
Agribank	Vietnam Bank for Agiculture and Rural Development
AI	Artificial Intelligence
AR	Augmented Reality
ASEAN	Association of Southeast Asian Nations
B2B	Business-to-business
B2C	Business-to-consumer
BEPS	Base Erosion and Profit Shifting
BOJ	Bank of Japan
BRICS	Group of Brazil Russia India China and South
CEIC	Census and Economic Information Center
CIEM	Central Institute for Economic Management
CNY	Chinese Yuan
CPI	Consumer Price Index
CSIRO	The Commonwealth Scientific and Industrial Research Organisation
DAI	Digital Access Index
DNSSEC	The Domain Name System Security Extensions
ECB	European Central Bank
EGDI	E-Government Development Index
EIA	U.S. Energy Information Administration
EU	The European Union
EUR	European Currency
FDI	Foreign Direct Investement
Fed	Federal Reserve System
FIA	Foreign Investment Agency
FRED	Federal Reserve Bank of St. Louis
FTA	Free Trade Agreement
FVA	Foreign value-added
GBP	The British Pound Sterling
GCI	Growth Competitiveness Index
GDP	Gross Domestic Product
GE	Gross Exports

GEP	Global Economic Prospects
GSO	General Statistics Office of Vietnam
GTAI	Germany Trade & Invest
GVC	Global Value Chain
GWC	Global Working Council
HSBC	The Hong Kong and Shanghai Banking Corporation
I2E	Importing to Export
IEF	Index of Economic Freedom
ILO	International Labour Organization
IMF	The International Monetary Fund
IoT	Internet of Things
IPI	Industrial Production Index
ISIC	International Standard Industrial Classification
ITC	Information Technology and Communication
JGB	Japanese Government Bond
JPY	Japanese Yen
LDP	Liberal Democratic Party
M2M	Machine to Machine
MIC	Made in China 2025
MITI	Ministry of International Trade and Industry
NAFTA	North American Free Trade Agreement
NEER	Nominal Effective Exchange Rate
NESDB	National Economic and Social Development Board
NMI	Non-Manufracturing Index
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
OPI	Online Price Index
PBoC	People's Bank of China
PCI	Provincial Competitiveness Index
PMI	Purchasing Managers' Index
PPP	Purchasing Power Parity
PTA	Preferential Trade Agreement
QE	Quantitative Easing

qoq	Quarter on Quarter
R&D	Research & Development
RCEP	Regional Comprehensive Economic Partnership
REER	Real Effective Exchange Rate
SBV	The State Bank of Vietnam
SME	Small and Medium Enterprises
SOE	State-Owned Enterprise
TCJA	Tax Cuts and Jobs Act
TFP	Total Factor Productivity
TLTRO	Targeted longer-term refinancing operations
TPP	Trans-Pacific Partnership Agreement
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USD	US Dollar
VAT	Value-Added Tax
VND	Vietnamese Currency
VR	Virtual Reality
VSIC	Vietnamese Standard Industrial Classification
WB	World Bank
WEF	World Economic Forum
WEO	World Economic Outlook
WGA	World Governance Assessment
WGI	Worldwide Governance Indicators
WTI	West Texas Intermediate
WTO	World Trade Organization
yoy	Year On Year
Ytd	Year To Date

EXECUTIVE SUMMARY

Vietnam Annual Year Report 2019 is produced when Vietnam economic growth slowed down at the beginning of the year due to weakening external and internal drives. The strategy to motivate growth via traditional resources, such as natural resources and cheap labor, is no longer suitable, as the 4th industrial revolution has been creating fundamental changes to technological and digital resources, providing the seemingly unlimited potential to economic growth. Under such circumstances, this year's Report, entitled "On The Doorstep to the Digital Economy", focuses on evaluating the potential for Vietnam to transition into the digital economy. We think locating ourselves in the roadmap towards the digital economy is necessary, in order to determine overall methods and strategies for the economy.

About the structure of the report, the first two chapters provide outlooks of both the world economy and consequently the Vietnam economy. The next three chapters delineate insights into different aspects of the digital economy, as well as assess our promising to survive in the Age of Network Intelligence. Specifically, we identify the necessary and sufficient conditions to acquire digital advances, by analyzing the main pillars: our ITC and energy infrastructure; internet security; data administrations; digital skills and capabilities of our workforce; the Digital government and Open data; and tax reforms and legal regulations. Chapter 4 investigates our potential to contribute to the global value chains, in responding to the challenges of the 4th industrial revolution. Chapter 5 provides an overview of the applications of online data in consumer price estimation. From the results of our researches, we advocate the expanding use of Big data in economic statistics, in order to elevate our early warning capacities and ensure economic stability. Closing the report, chapter 6 draws two scenarios of Vietnam in 2019, and also provides policy recommendations in short, medium and long run.

OVERVIEW OF THE WORLD ECONOMY IN 2018

The world economy has well maintained the growth incentives of the year 2017 in the first half of 2018, but in the second half of 2018 experienced a wide range of new challenges affecting "health" of the global economy, reducing the growth rate of global trade, weakening production activities, leading to a disruption of global value chains and affecting global FDI flows. The global economic growth in 2018 fell to 3.6%, lower than a forecast of 0.3% and 0.2% lower than that of 2017 (IMF, 2019). The reduction in global growth is resulted from the US - China trade war, macroeconomic tensions in some emerging economies such as Argentina and Turkey, the "normalization" of monetary policies in some developed economies, stricter credit policies of China along with declining global investment, which lead to an increase in uneven growth among countries around the world. Global FDI flows in 2018 plummeted by 19% compared to that of 2017 and was the lowest level since the 2018 financial crisis. This decline originates from two main reasons: (1) the US's Tax Cuts and Jobs Act (TCJA) effective from January 2018 has resulted in increase in foreign income repatriating to the parent company in the US instead of being reinvested, contributing to

the decline in global FDI; and (2) the decline in the cheap labor advantage as well as the economic geographic advantage of many developing countries.

The complicated changes of global trade in 2018 such as the US-China trade war, the difference in the viewpoints of nations at the G20 Conference and the difficulties of the WTO in regulating multilateral trade resulted in a slower global trade growth in 2018 but this growth rate still recorded at a high level. Global trade in 2018 still grew strongly compared to that of 2017 with total exports in 2018 reaching 19,287 billion USD compared to 15,850 billion USD of 2016 and 17,543 billion USD of 2017. However, the growth in 2018's global trade value was mainly driven by rising commodity prices rather than increasing trade volume, especially oil and metal prices.

The year 2018 witnessed the upward trend in trade protection measures. For the G20 group, 145 trade remedies measures, mainly anti-dumping measures, and 40 trade restriction measures were adopted (WTO, 2018). For the Asia Pacific region, the number of new discrimination measures was 33 per month on avearge, which was twice the number of new trade liberalization measures. At the global scale, on average, the number of new discrimination measures increased by 88 per month, which was much higher than the number of new trade liberalization measures (32 measures/month) (ESCAP, 2018). Increased trade restrictive measures are assessed to have a limited impact on global trade flows (Islam et al, 2018).

Besides the increase in trade protectionist measures, as of November 2018, about 33 trade facilitation measures were implemented by G20 countries, most of which are related to tariff reduction and eliminattion, and customs (WTO, 2018). These factors have helped somewhat compensated the impact of trade restrictions, enabling global trade to overcome the complicated fluctuations of the world economy in 2018.

The digital economy has promoted the establishment and development of online markets, and e-commerce activities. In recent years, revenue from e-commerce activities has increased rapidly. In 2015, the global e-commerce market achieved a turnover of 25.3 trillion USD (UNCTAD, 2018) and by 2017, this number increased by 13%, to about 29 trillion USD (Azevedo, 2019). The proportion of e-commerce across the border is increasing. The number of consumers participating in online buying and selling and looking for foreign buying sources have rapidly increased. Cross-border B2C in 2015 reached 189 billion USD with about 380 million online consumers purchassing on foreign websites, accounting for 1.4% of total imports of goods and equivalent to about 7% domestic B2C e-commerce (UNCTAD, 2018). In 2017, about half of the world's population purchased goods and services online, along with the proportion of online buying and selling from abroad in total B2C e-commerce revenue increased from 15% in 2016 to 21% in 2017 (Azevedo, 2019). It is forecasted that by 2020, cross border e-commerce will account for about 22% of the total global e-commerce.

Crude oil price increased continuously from June 2017 to October 2018 and reached 70.75 USD per barrel of WTI oil due to 3 main reasons related to concerns about supply shortage including (1) OPEC and allied nations fail to find a solution to offset the shortage of oil from Iran due to US sanctions; (2) demand for crude oil continues to rise; and (3) the worsenting situation in Venezuela. However, crude oil price suddenly reversed sharply in the last 2 months of 2018 to 49.52 USD per barrel. The decline in oil price by more than 42% within two months has been unprecedented in recent years due to changes in the US policy. The US and other two biggest oil producing countries, Saudi Arabia and Russia, have increased their oil production with a recorded rate in the context the world crude oil demand has declined due to sluggish global economic growth.

The world economy in 2019 will continue to experience many difficulties namely potential geopolitical risks, unpredictable predictions related to Brexit, and trade disputes between the US and partner countries, especially the increasing US-China trade war. In this context, according to UNCTAD's forecast (2019), the prospect of global FDI in 2019 might be not optimistc when FDI inflows to the developed countries is the main motive for promoting the on-going declining global FDI in recent years. The negative impact of US's Tax Cuts and Jobs Act on investment flows will be persistent, affecting the scale and structure of US multinational companies' reinvestments and FDI inflows to the developed countries. As a consequence, the recovery of global FDI flows in 2019 are extremely difficult.

The year 2019 will witness the cautious monetary policies in key economies. After four time increases in interest rates in 2018, Fed did not raise interest rate in the period of March 2019 as previously planned but maintained it in the range of 2.25 - 2.5%. In the context of US economic growth decline in 2019 due to the US-China trade war, Fed might maintain the current interest rates until the end of 2019. Other key economies such as the EU and Japan might continue to maintain the recorded low interest rates in 2019. China would maintain the current interest rates and intervene in foreign exchange rates to make the yuan weak to support declining exports under trade war with the US. With such responses, USD will appreciate slightly compared to other major currencies in 2019.

Besides the above difficulties, at present, the industrial revolution 4.0 is strongly affecting the world economy, creating opportunities and challenges for countries in the process of socio-economic development. The world economy will witness the fact that the developed countries will step into a growth phase that is based on the unlimited technology and innovation. FDI flows of multinational companies will return to the developed countries near the consumer markets and research and development centers. With the 2019 forecasts which go biased towards negative changes in 2019, the global economic growth rate in 2019 will decrease compared to that of 2018.

OVERVIEW OF THE VIETNAMESE ECONOMY IN 2018

Vietnam met the socio-economic targets for the year assigned by the National Assembly despite the uneven economic recovery and successive difficulties in globe. Referring to the supply side, the economic growth of 7.08% surpassed the government's target of 6.7% and was the highest figure in the last 10 years. The industry and construction sectors, and the service sector were key growth drives with the contribution of 3.44 and 3.02 percentage points respectively. Particularly, the processing and manufacturing industry was the main force to the economy with the highest growth rate of 12.98%. Along with that, the Purchasing Managers' Index (PMI) stayed at a high level of over 50 points and recorded the 37th month of the manufacturing sector expansion, which kept Vietnam remain the leading position in the ASEAN's PMI rankings (Nikkei, 2019). That was a positive signal of both the manufacturing sector and economic growth. However, 2018 still witnessed a slow pace in labor growth rate that lasted since 2015. The FDI sector, which was the main job creator with rapid growth, only reached 3.3% in labour growth. Thus, combined with the development of science and technology in enterprises, that leads to a common worry that whether the labor market is at risk of shrinking in the digital economy. The application of autonomous machines in production to enhance productivity lowered the labour demand. Similarly, the number of enterprises suspended from operation also increased abnormally in the fourth quarter of 2018. The underlying cause was the scanning program towards enterprises being inactive but not notified competent authorities. However, in general, the goal of getting one million businesses by 2020 is quite unrealistic. The number of employees in newly established enterprises in 2018 is 1,107.1 thousand people, decreasing by 4.7% (GSO, 2019)

With regards to the demand side, goods consumption and retail improved in both value and quantity compared to 2017's figures. The total value was estimated at 4,395.7 trillion VND, up 11.7%, which was higher than that in previous years such as 11.0% growth in 2017 and 10.2% growth in 2016. List of essential goods experiencing rapid growth included foods (12.6%); household appliances, tools and equipment (12.3%); garments (12.4%) (GSO, 2019). Besides, the total social investment reached 1,856.6 trillion VND (equivalent to 33.5% of GDP), up 11.2% compared to that in the previous year. The private sector accounted for more than 43% of total investment and experienced the growth of 18.5%, which far exceeded 4% growth rate of the state sector. The FDI sector, accounting for the smallest proportion in the structure of the total social investment, also witnessed 9.5% growth rate in 2018. Thus, it can be seen that the investment from the state sector was narrowed down along with the speedy process of restructuring state-owned enterprises since 2015. The private and FDI sectors are forecasted to gradually dominate the state in terms of investment capital. Referring to FDI, total disbursed FDI reached a high level of 19 billion USD in 3,046 newly registered FDI projects. The processing and manufacturing industries accounted for one third of a total registered capital, up to roughly 9 billion USD. Japan was the biggest FDI source in 2018 with a total registered capital of 8.60 billion USD and 429 new projects, followed by South Korea, Singapore, and Hong Kong.

International trade in 2018 also underwent positive changes and contributed significantly to exceed the economic growth target. Compared to 2017, total export and import turnover increased by 14.1% (reaching 244.72 billion USD) and 12.9% (reaching 237.51 billion USD) respectively. Similar to previous years, exports from FDI enterprises accounted for 71.7% of total export turnover and reached 175.52 billion USD (up 13.1%). So, they saw a trade surplus of 32.81 billion USD while the domestic sector saw a trade deficit of 25.60 billion USD, which implies that export achievements depended greatly on the FDI sector. However, except for creating jobs, the surplus from this sector did not benefit to domestic economy because it would be transferred abroad in the form of investment income. Secondly, the dominance of few of large businesses in exports made the growth more vulnerable once these businesses face difficulties. In 2018, there are 29 products achieving export turnover of more than 1 billion USD and accounting for 91.7% of total exports such as mobile phones and components with 50 billion USD of export value (mainly from Samsung), up 10.5%; textiles and garments with 30.4 billion USD, up 16.6%. The US was Vietnam's largest export market, followed by the EU, China and ASEAN. As for the import side, production materials for manufacturing and processing industry dominated 91.4% of total value. China was still the largest import market with the amount of 65.8 billion USD, up 12.3%. The devaluation of CNY lowered the prices of goods imported from China and thus entered a higher volume to the Vietnamese market.

Besides, some monetary-related indicators tended to increase in 2018. Firstly, the average CPI increased by 3.54% compared to 2017. Although it met the target of less than 4% for the year assigned by National Assembly but the price increase in gasoline, medical services, and tuition fees would poses a high risk of inflationary pressures in 2019. Secondly, interbank interest rates moved upwards in the year. The overnight and one-week interest rates sometimes went close to the 5% level. Due to the worries of rising inflation, deposit and lending rates at commercial banks began to go up after stabilizing in 2018. Thus, it is expected that SBV would change policy instruments if inflation continues to increase. Credit growth slowed down owning to the development of the corporate bond market. Mnufacturing and processing industry were still the sector accounting for the largest share of the total credit in 2018. Thirdly, the VND/USD exchange rate of commercial banks and SBV went up. This fact showed that the SBV, though not officially stated, has been implementing "crawling peg" policy by a drastic devaluation rate through adjusting the official exchange rate daily to maintain the competitiveness of Vietnamese goods. The governmnets should be cautious in monetary management once financial shocks happen in globe such as the devaluation of CNY compared to USD.

Regarding to government administration, although budget revenue exceeded the estimate, the 2018's budget deficit remained at 3.46% of GDP. The ratio of public debt to GDP and public debt to budget revenue decreased slightly but still high. However, it is noticeable that high proportions of recurrent expenditure, persistent budget deficit along with the rapidly increasing debt repayment are concerns in fiscal management.

In general, the Vietnamese economy in 2018 experienced many achievements, especially in maintaining the highest growth rate in 10 years as well as keeping inflation at a low level under the National Assembly's target. However, there are potential risks. First, economic growth, exports or employment are increasingly dependent on the FDI sector which offered little benefit, threated to environment, and created inequality in the business environment with the domestic sector. Secondly, the private sector grew less than expected and under many barriers from the institutions and business environment. Thirdly, the influence of monetary policy the economy was gradually narrowed by increasing inflation pressure as well as by commitments in exchange rates management. Finally, fiscal policy did not create positive changes in the structure of budget revenue, while there were high public debt, budget deficit and diminishing state assets. This implies that Vietnam is lacking "fiscal buffer" to deal with external shocks

To confront these issues, the governments should firstly focus on cut business conditions in order to improve the business environment to overcome domestic shortcomings and take advantage of US-China trade tensions and FTAs. The State Capital Management Committee should simplify its management system, thereby, it can tackle obstacles and encourage the process of equitization State-owned enterprise. The committee should avoid the unreasonable protection over the SOEs who is more difficult to attaint operation efficiency in comparison to the private sector. The government should revise tax incentives and land leasing condition offering to FDI sector in order to redress the balance in doing business between FDI and domestic sector. Finally, Vietnam should focus on fiscal, monetary and exchange rate policy to protect the economy against the volatility of the world economy by flexibly monitoring exchange rate; stabilizing the interest rate; declining the leverage and alleviate financial distress in the banking system; and gradually construct the fiscal buffer by simplifying the government system and reducing the current expenditures

VIETNAM'S FUTURE DIGITAL ECONOMY

Decades of rapid growth and structural reform have transformed Vietnam into a lower middle-income country. Vietnam achieved lower middle-income status in 2010 and is aspiring to achieve to high-income status over the next 2-3 decades. However, the path to high income status is not guaranteed and will not be easy. It is also highly unlikely that development strategies that rely on agriculture and mining commodities and the availability of cheap labour for manufacturing can to continue to move up Vietnam's industries up global value chains and increase the national income levels. Economic advancement will require a shift in focus to enhancing total factor productivity across all industries, and moving away from being an input-driven, low-cost labour market.

The next wave of digital technologies – AI, blockchain, the Internet of Things, and platforms and cloud-based services – has the potential to leapfrog many industry infrastructure upgrades, simplify supply chains and logistics, and help businesses operate more efficiently.

Building upon Vietnam's emerging digital economy will create the opportunity for Vietnam to maintain rapid and sustainable growth in the next phase of development.

This chapter describes Vietnam's the digital economy in 2019, determines megatrends that will drive Vietnam's digital economy into the future and creates four potential scenarios for Vietnam's digital economy in 2045. The future scenarios are distinctly different, reliant on a mix of internal and external factors with varying estimated impacts on GDP and job disruption. This chapter also presents a roadmap for Vietnam to accelerate its digital economy while minimizing the risks under all four scenarios.

Chapter 3 utilizes strategic foresight techniques to create a range of four plausible future scenarios for the year 2045. These techniques initially use horizon scanning to identify key emerging trends and drivers of change. Trends are then grouped into overarching trends to identify megatrends driving the future digital economy. From these megatrends four future scenarios have been created for Vietnam's digital economy in 2045. The scenarios were created by using the megatrends likely to cause the greatest impact and greatest uncertainty as the axis to four quadrants, and foreseeing how they might impact Vietnam's future digital economy.

The main structure of the chapter consists of four main sections. The first defines the digital economy: *"All businesses and services that have a business model based primarily on selling or servicing digital goods and services or their supporting equipment and infrastructure."* This chapter also provides an overview of the broad base of Vietnam's digital economy. A benchmarking exercise between Vietnam and neighbouring countries shows that Vietnam is in a good position to develop the digital technology in the future. Relative to other nations, Vietnam's strongest areas are high technology exports and performance on the Global Innovation Index. The section also provides an initial view of the size and capabilities of Vietnam's digital economy, and particularly digital adoption in the nation's largest industries – agriculture and manufacturing

The second chapter focuses on seven megatrends that will drive the development of Vietnam's digital economy. These include i) emerging digital technologies; (ii) internationalization; (iii) increasing need for cybersecurity and privacy; (iv) increasing demand for modern digital infrastructure; (v) smart cities; (vi) digital skills, services, gigs and the entrepreneur; and (vii) changing consumer behaviors.

The third section is devoted to the description of four scenarios of Vietnam's future digital economy in 2030 and 2045. These include: (i) Heritage scenario with low ICT development and adoption across the economy; (ii) Digitally Transformed scenario with major digital transformation across all industries and government services and rapid growth in exports of ICT products and services; (iii) Digital Exporter scenario with slow industrial transformation but fast growing pockets

of ICT industry; and (iv) Digital Consumer scenario with broad industrial transformation across Vietnamese industry, but the ICT industry has struggled and ICT exports are not a significant component of Vietnam's exports. The scenarios include modelling to estimate levels of job disruption across varying sectors, as well as potential impacts on Gross Domestic Product (GDP)

In the end, the authors structure a broad roadmap for Vietnam to facilitate the digital economy while minimizing risks associated with all scenarios. Priorities of the roadmap include: (i) enabling infrastructure such as ICT or energy; (ii) Security of the networks; (iii) Increasing digital skills and capabilities; (iv) Modernising government; (v) Industry 4.0 and the National Innovation; and (vi) Taxation and Regulatory Reform. While these actions are prioritised, they are not necessarily sequential; many of these actions will need to occur at the same time.

VIETNAM'S PARTICIPATION INTO THE GLOBAL VALUE CHAIN IN THE CONTEXT OF THE 4TH INDUSTRIAL REVOLUTION

Vietnam has emerged as an Asian manufacturing powerhouse, specializing in assembly functions primarily led by foreign firms (Nakamura, 2016). The manufacturing and processing industries have dominated the export values with 42 percent and 40 percent shares in 2017; in comparison with 11 percent and 41 percent respectively in 2006 (GSO, 2017). This leap accredited to the strategic orientation of Vietnam on exporting medium and high-tech products such as telephones, computers, …Thanks to the manufacturing giants such as Samsung Electronics, LG Electronics, IBM, Nokia, and Intel... Manufacturing giants imported intermediate products from their subsidiary companies located abroad, contributing in the backward participation of Vietnam in GVC. Vietnam also has remarkable GVC participation in foods, beverages, textile and footwear.

GVC provides Vietnam with job creation, specialization on a certain stage of global production, and spilling-over of the technology and management skills through local learning (Taglioni & Winkler, 2016). However, benefits from participating in GVC are not automatic. Benefits vary considerably depending on participation through backward linkages or through forward linkages, and on the position of the reference country on the value chain. A country, which predominantly assembles the intermediate products into final goods and subsequently export them will have a strong backward participation but a small forward participation. A country, which predominantly supplies domestically produced intermediate products to an assembler, will have a strong forward participation but a weak backward participation.

Trade structure of Vietnam shows that the proportion of intermediate products in import structure is larger (47.9 percent) than the proportion of the same in its export structure (GSO, 2017). Vietnam has stronger backward participation than forward participation in GVCs. Relying on I2E (importing-to-export) pattern of economic growth, Vietnam has consistently achieved higher economic growth for over a decade, reaping the benefits in terms of job creation, foreign reserves, and improving living standard…. However, how long can Vietnam sustain this growth

model?. To answer this question, we analyze two main threats to the sustainability of the export-led economic growth: the inherent bottleneck in the export-led growth model and the pattern of Vietnam's GVC participation.

The inherent bottleneck in the export-led growth model. The overall exports pattern of Vietnam portrays its following the footsteps of export-led growth model of Mexico, whereby it has also turned itself into export production platforms for foreign multi-nationals by suppressing the wages, rather than developing own indigenous industrial capacity. This export-led growth strategy is different from the one adopted by Germany or Japan or Asian Four Tiger countries or China. These countries' export strategies led to enhance their own industrial capacity. The Mexico model was considered less successful so far: Sluggish GDP growth, unchanged labor productivity has been, and total factor productivity growth has been negative. With the rising living standards, ultimately the comparative advantages of cheap labor force would vanish in the future, which means a wave of assembly jobs would flow out of Vietnam leaving masses of workers without jobs. The assembling platform strategy should be bonded with the strategy to develop own indigenous industrial capacity, and national technological base. These will help Vietnam to upgrade activities along value chains in forms of: Product upgrading; Process upgrading; Functional upgrading; and/or Sectoral Upgrading so that it can switch Vietnam goals "assembling agent" to "indigenous producer".

In 2015, GVC participation rate of Vietnam is 56 percent which is a significant jump in comparison to just 34 percent in 1995. However, increment comes from backward participation that shares 45 percentage points and the forward participation contributes only 11 percentage points. Moreover, the contribution of forward participation has been weakening since 2000. In terms of position on the value chain, none of the industries are located in the upstream position (GVC position indices of all industries are negative). Only two industries including other transport and wholesale and retail trade have taken on the larger negative indices and are thus positioned downstream. Rests of the industries including crucial industries for Vietnam such as textile and footwear, electronics and electric, automotive etc. are positioned in the middle-stream on the value chain.

Adaptation of Industry 4.0 may increase Vietnam's GDP by 28.5 billion USD to 62.1 billion USD by 2030 (CIEM, 2018). Per capita income of Vietnam would also increase by an additional 315 USD to 640 USD (VIR, 2018). In Industry 4.0 concept, there will be real-time communication between machines, products and logistic system resulting increase in the overall productivity and efficiency which in turn will increase the cost competitiveness. CI.4.0' and challenges: Robotic systems will minimize the cost economies of manufacturers that are realized from locating manufacturing activities in low labor cost countries, now affecting the employment opportunities in those low labor cost countries. Increasing adoption of additive manufacturing technology (e.g. 3D printing) is likely to locate the manufacturing plants closer to the final customers. The spread of additive manufacturing would reduce trade in finished goods, and local

availability of the necessary raw materials would also reduce trade in intermediate goods (Strange and Zucchella, 2017). The industrial revolution will navigate countries' position in global value chains. Let's look back two important aspects of growth model of Vietnam: Firstly, its growth depends heavily on its 'assembling based exports'. Secondly, its increased GVC participation is primarily due to MNEs operating in country. Under that scenario, Vietnam is not optimistic because: The greater automation in manufacturing process will shift the work from low skilled labor market to high skilled labor market, and also the integrated model of manufacturing process will ultimately move the manufacturing plants close to the customers' markets. Vietnam is at risk if MNCs, which are now operating in Vietnam, will prefer to move out of the country for any or both of those purposes. Hence Vietnam must upgrade to the GVC Governor, not just a specified stage. The Korean and Taiwan proofed this success. However, there are many reasons to believe that the existing MNCs may not prefer to shift their work out of Vietnam, including: Vietnam's strategic position in the East Asia; Its interests and involvement in several deep Preferential Trade Agreements (PTAs) that if ratified may give tariff-free access to the key markets such as US and EU; Highly competitive in terms of labor costs etc.

An ILO country report (2016) shows that about 17 percent of the total 54 million labour force are engaged in the manufacturing sector alone in Vietnam, of which textile and footwear contributes 36 percent and electronics and electric sector make up nearly 5 percent. Though the current prospects for these two sectors are strong, however, in the medium and long-term, advances in new technology and automation could bring significant changes. ILO (2016) estimates that 86 percent of all wage workers working in textile and footwear sector will face a high risk of automation. Most electronics and electric factories in Vietnam target low-value production and low-skilled assembly work, with a focus on integrated circuits, semiconductor devices, and printed circuit boards. Given the repetitive nature of assembly work in this sector, a high proportion of wage workers (around three in four) are at high risk of automation in the coming decades (ILO, 2016).

Software Industry has strong forward linkage but only at middle stream, working as sub-contractors for foreign companies (ITCnews, 2019). Meanwhile, manufacturing has trong backward linkage (opposite of Software Industry). If their positions are exchanged, Vietnam would be more beneficial in the GVC. In the long-run, IR 4.0 will support Vietnam to get out of the "middle stream" trap, moving up to both upstream and downstream stages. In the short-run, Vietnam is still in the Middle stream. Technology can embeded in the current stage, lifting up the smiley curve. It means same stage but higher added value. Finally, GVC is not as flat as it used to be. The distance among stages of production will be shortened and the added value will be more different.

APPLICATION OF BIG DATA IN MACROECONOMIC STATISTICS: USING ONLINE DATA FOR INFLATION NOWCASTING

The popularity of the global network, along with the development of digital technology platforms, quickly translates our perception of data. Today, data is considered a valuable raw resource, rather than the final results of costly social surveys. Big data reflects the activities of global network participants, provides analysts with new insight, and allows us to make better economic and business decisions. With automated data-collecting tools, the frequency and volume of data that can be collected are much bigger than the data from sociological surveys, at a much lower cost. A new trend from statistical organizations around the world today is to use automatically collected data to supplement or replace traditional economic statistics.

In particular, the *Consumer Price Index* (CPI) is one of the keys statistical indexes that economists concern. Consumer price is the price that consumers buy goods or pay for services that directly serve daily life, expressed by the retail price of goods and services on the market (including VAT) that serve life activities, excluding land prices, prices of goods sold for production and business activities. Data collection in computation for this index mainly follows two groups of methods: traditional methods of collecting data in surveys and non-traditional methods that utilize alternative technologies, which allows data to be collected continuously while staying reliable. In both methods, the prices collected are classified into different categories in the commodity basket and are combined with a set of weights to calculate the final Consumer Price Index.

Around the world, there have been many studies that use digital technology, such as scanner data, web-scraping, and price collected from mobile applications to collect consumer prices. Big data is not only a complementary source of data for consumer price index computing but also plays an increasingly important role in improving the accuracy and timeliness of these statistics. To highlight the sensitivity and speed reflecting the change of price, the term inflation nowcasting is becoming popular in economic statistics.

In this study, we implement web-scraping techniques to collect prices from the largest online sellers in Vietnam over a period of more than 11 months (from April 2018 to the end of March 2019). After the data are carefully cleaned and properly stored, we classify the collected data into CPI basket structure to calculate a price index, which reflects the change of prices of goods that are sold on the e-commerce market in Vietnam. We called this index as the *Online-based Price Index* (OPI).

Although inflation actually affects more or less the price of goods sold on the Internet, the online market has different pricing mechanisms than traditional markets. Online sellers can automatically change the price across a wide range, while buyers can easily compare the price of the same item between different websites. These create a market in which prices quickly converge between different sellers and dynamic pricing behavior (setting prices according to the demand of commodities) and become popular.

The similarities and differences between the traditional market and the online market are reflected in our comparison between the Online-based Price Index (OPI) and the Consumer Price Index (CPI) over the same time period. While the changes in price in the commodity group *Food, Foodstuffs And Related Services* are similarly reflected by OPI and CPI, other commodity groups such as *Garment, Hats And Footwear*, *Household, Equipment And Appliances* and *Culture, Entertainment And Tourism* more or less betray different price trends between online markets and the traditional market.

The Online-based Price Index, although still in a rudimentary state, implies promising application of online data. It can be used not only to nowcast inflation but also to study more about the pricing mechanisms in the e-commerce market. The expansion of price data collection will also pave the way for other large-scale studies on the impact of shocks of a group of good prices on the health of the economy. Data collected from other countries are also a valuable source, which can help us to understand the impacts of shocks on international markets to the domestic market.

VIETNAM'S ECONOMIC PROSECTS IN 2019 AND POLICY IMPLICATIONS

In addition to suggested medium and long-term policies which incorporate the policy views proposed from the specialized chapters of the Report, Chapter 6 provides a two-scenario forecast for Vietnam's macroeconomic outlook in 2019 and discusses in detail some of the short-term policies which are currently implemented.

The economic growth rate of Vietnam in the first months of 2019 was slower than that of the same period last year because internal and external forces were stifling economic growth. In this context we give a two-scenario forecast for economic growth. In the first scenario we project that the GDP growth rate will be 6.56%, roughly the target set by the National Assembly. This scenario may occur due to the less favorable world economic conditions. The impact of the escalation of US-China trade war tensions puts Vietnam under new pressures and puts the country at risk of a trade deficit exacerbated by the Chinese exports and increased competition in the domestic market as both the US and China can boost their exports to Vietnam. In addition, other countries also want to seize opportunities from the US-China trade war to boost their exports to the US and China, so it is not easy for Vietnam to increase exports to both markets. The second scenario at 6.81% is feasible, meeting the target of the National Assembly. This scenario is can occurr thanks to the economic growth momentum of 2018, coupled with Government efforts to improve competitiveness and productivity, reflected by the high relative growth of major industries in the early months of 2019. Besides, the State and the private sector in Vietnam are trying their best in the field of international trade. This is can be seen in the export growth rate of domestic enterprises which are higher than that of FDI enterprises in the first quarter of 2019. This is

different from the trend of many years ago because FDI enterprises always achieved higher growth rates than those of domestic enterprises.

Regarding to the price level, inflation is expected to become more difficult to control in 2019 and it is likely to reach 4-5%. In the first scenario, with economic activity slower than expected, inflation will reach 4.21%. In the second scenario, the annual inflation rate is forecast to reach 4.79%, higher than the 4% target of the National Assembly. The risk of inflation in the second scenario is quite possible if there is a resonance from both rising internal and external inflationary pressures. In terms of internal pressure, price adjustments for public services as well as petroleum prices implemented at the beginning of 2019 will put great pressure on inflation. By the end of April 2019, the consumer price index increased by 2.93% (yoy) and ongoing shows an upward trend. Meanwhile, this rise only reflects a very small part of the government's price adjustments due to their latency. In terms of external pressure, world crude oil prices may continue to rise due to escalation of the Middle East tensions and cutting world crude oil supply. In order to curb inflation regulating authorities will need to closely monitor prices in the second half of the year. The SBV should be cautious about regulating money supply, interest rates and credit in the coming months if it wants to maintain inflation level within its target.

Finally, Chapter 6 summarizes policy recommendations in the medium and long-term, focusing on aspects relating to the future digital economy of Vietnam as indicated in the specialized chapters of the Report.

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FRIEDRICH NAUMANN FOUNDATION For Freedom. Vietnam

Vietnam Annual Economic Report 2019

ON THE DOORSTEP TO THE DIGITAL ECONOMY

Hanoi, May 29, 2019

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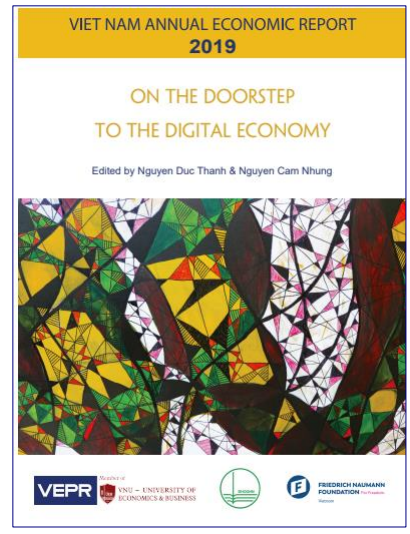
The Context of VAER 2019

- Vietnam Annual Economic Report 2019, titled "***On the Doorstep to the Digital Economy***", was conducted when the 4th industrial revolution has been creating breakthroughs in human life and production, changing the role of production factors and their global flows. Viet Nam is standing on the doorstep to the comprehensive digital transformation for better integration into the world. But are we well-prepared?
- The Vietnamese Government announces that they prioritize the completion of the digital government in 2016-2020, in order to build a solid foundations for a comprehensive digital transformation towards a future digital government, digital economy.



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Contributors

1. **Assoc. Prof. Dr. Pham The Anh**
2. **Jessica Atherton**
3. **Dr. Lucy Cameron**
4. **Shashi Kant Prasad Chaudhary**
5. **Ha Thi Diu**
6. **Dr. Tran Viet Dung**
7. **Assoc. Prof. Dr. Nguyen Viet Khoi**
8. **Dr. Pham Thu Hien**
9. **Nguyen Duc Hieu**
10. **Dr. Vu Thanh Huong**
11. **MSc. Bui Ha Linh**
12. **Bui Thi Thuy Linh**
13. **MSc. Nguyen Thu Nga**
14. **Dr. Nguyen Cam Nhung**
15. **Assoc. Prof. Dr. Nguyen Duc Thanh**

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Good Policy, Sound Economy

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Good Policy, Sound Economy

Overview of the World Economy 2018

Main Contents

- Introduction
- Situation of some Major Economies
- Global Trade
- Global Investment
- World Commodity Prices
- Global Unemployment
- Prospects for 2019 and beyond
- Conclusions and Implications for Vietnam

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Introduction

The world economic growth rate in 2018 decreased to 3.6%, lower than the forecast of 0.3% and 0.2% lower than that of 2017 (IMF, 2019) due to:

- Trade tension between the US and partner countries, especially the US-China trade war.

- Macroeconomic tensions in some emerging economies such as Argentina and Turkey.

- The US's tightening monetary policies and China's stricter credit policies.

- Declining global investment resulted in an increase in uneven growth rates among countries in the world.

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The US Economy

Growth Rate Below Projected Target

- US's economic growth reached 2.9% in 2018, 0.1% lower than the target set by President Donald Trump.
- Due to coping with the US-China trade war in the second half of 2018 and the appreciation of the USD, the US trade deficit grew and amounted to USD 59.8 billion in December 2018. As a result, US's total trade deficit of goods reached a record of USD 891.3 billion in 2018, the highest level in the last 10 years.
- Fed has confidently maintained to "normalize" monetary policy by raising interest rates as planned. Fed raised interest rates four times in 2018 on March 22, June 13, September 27 and December 19 while the EU, Japan and China kept interest rates unchanged.
- The normalization of monetary policy in 2018 aims at harmonizing the effects of fiscal expansion, limiting the sharp increase in aggregate demand and controlling domestic inflation.

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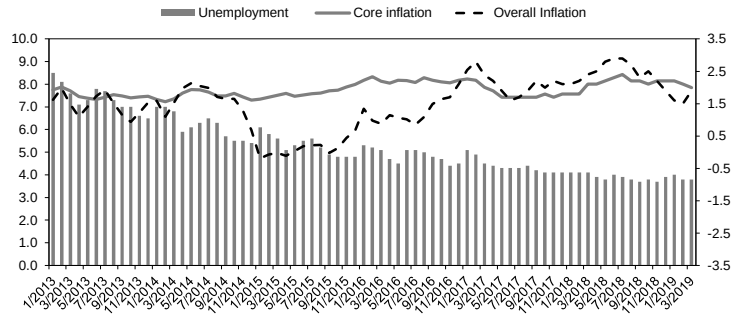
The US Economy

Growth Rate below Projected Target (cont.)

- Overall inflation and core inflation exceeded the target of 2% due to rising energy prices, housing and used cars.
- The economy was close to full employment with low unemployment rate of 3.9% in 2018.

The US's Inflation and Unemployment (%, yoy)



Source: Bureau of Labor Statistics of US (2019), CEIC (2019)

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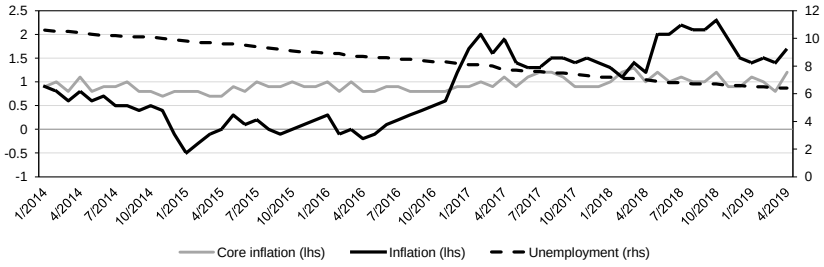
The EU

Weak Economic Growth

- The EU growth was only 1.8% in 2018, lower than 2.3% in 2017 due to uncertainties related to Brexit, the sharp decline of the German economy, and the economic recession and debt of Italia.
- Italy faced with an increasing public debt at 132.2% of GDP in 2018 and was recorded as the second largest public debt country in the EU after Greece.
- The unemployment rate decreased in the EU but was still higher than 2-digit level in Italy.

Unemployment and Inflation in EU28



Source: OECD (2019)

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The UK
Struggled With a Wide Range of Challenges

- The UK's growth rate continued to decline to 1.4% in 2018, 0.3% and 0.4% lower than it was in 2017 and 2016, respectively, and be the lowest level in 6 years.
- Weak domestic production because businesses concerned about instability post-Brexit and thus have not expanded investment.
- GBP tended to rise again against USD and EUR and therefore no longer played as a motive for the country's exports.
- Brexit's unpredictability continues to create difficulties for the UK in rebalancing its economy.

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Japan
Multi-faceted Economy

- Being affected by two economic recession periods in the first and third quarters at 0.1% and -0.6%, Japan's growth in 2018 was only 0.8%. Such a gloomy economy is due to a wide range of difficulties:
  - Natural disasters occurred consecutively in many places in the third quarter, hindering production activities
  - Due to the impact of sluggish global trade and ongoing trade disputes between the United States and China, demand for Japanese imports is affected.
  - The Japanese Yen experienced an upward trend compared to other strong currencies including the Euro, the Yuan and the British Pound in 2018, making Japanese exports less competitive in the international market.
  - Weak household consumption
  - Serious shortage of labor supply

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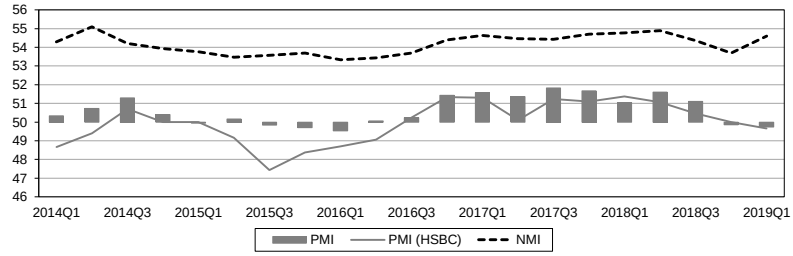
China
Potential Growth is Unstable

- Economic growth in 2018 was only 6.6%, the lowest growth since 1990 due to a lot of potential uncertainties including (i) the long-standing US-China trade war; (ii) decline in the stock market and high public debt burden of SOEs; (iii) reduction in both export and investment, and unbright domestic consumption.
- PMI index faced with continuous decline from November 2018 to February 2019 and below the threshold of 50 points, signaling the narrowed production in this period.

PMI and NMI of China



Source: AAStock (2019)

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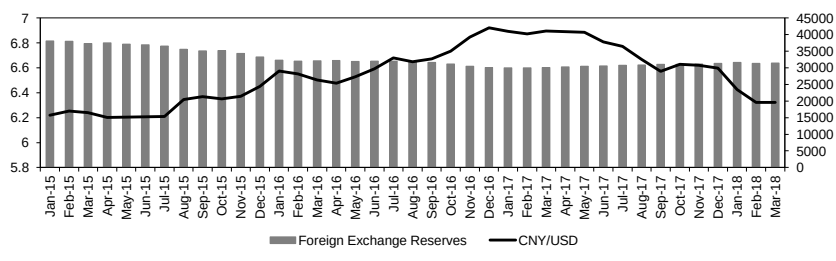
China
Potential Growth is Unstable (cont.)

- The government stimulated economic growth by boosting spending, cutting down compulsory reserve ratios for small and medium banks, and reducing taxes and fees.
- CNY devalued against the USD dollar from April to November 2018, contributing to boost China's export of goods and to stabilize foreign exchange reserves in 2018 around US $3.130 billion.

Exchange Rate and Foreign Exchange Reserves of China



Source: FRED (2019)

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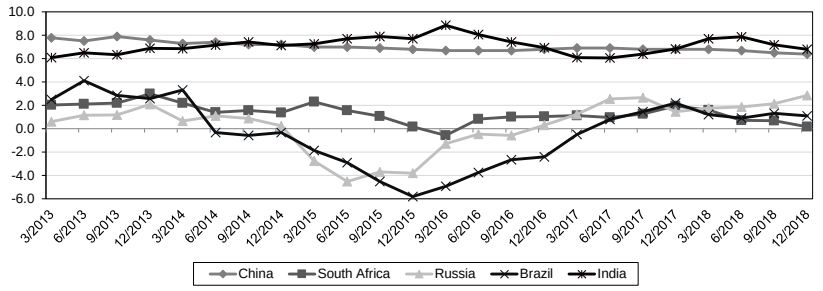
BRICS's Economy
Diverging Growth Rate

- While India, Russia and Brazil maintained growth rates at 7.1% (higher than 6.7% in 2017), 2.3% (higher than 1.5% in 2017), and 1.1% (equal to 2017) respectively, growth rates of China and South Africa reduced in 2018.
- South Africa's growth rate reduced in 2018 mainly due to stagnation in the agricultural, mining and manufacturing sectors in this most developed African economy.

BRICS' Economic Growth (%)



Source: OECD (2018)

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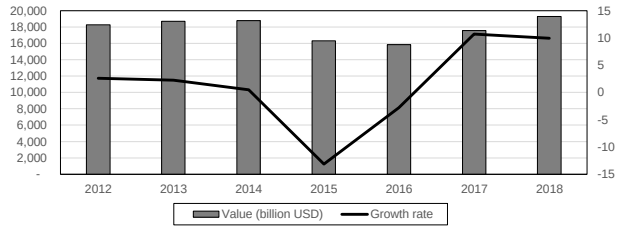
ASEAN Maintains Its Economic Growth

- ASEAN still maintains its economic growth under the spirit of "Resilience and Innovation". ASEAN has succeeded in implementing the five economic "arrows" that ASEAN Chairman outlined for 2018 including: (1) promoting innovation and e-commerce; (2) strengthening trade facilitation; (3) strengthening services and investment integration; (4) creating favorable legal environment; and (5) promoting external foreign relations.
- ASEAN 5 (Indonesia, Malaysia, Philippines, Thailand and Vietnam):
  - Achieve the growth rate of 5.2%
  - Vietnam (7.08%) and the Philippines (6.2%) achieved the highest growth rates
- At the 33rd ASEAN summit in Singapore in mid-November 2018, ASEAN economic ministers signed the first ASEAN E-commerce Agreement to facilitate cross-border E-commerce transactions. The Agreement is expected to contribute to boosting intra-regional trade and creating growth momentum for ASEAN members in the coming time.

Global Trade

- Global trade growth in 2018 was lower than that in 2017 but still reached a high level.
- In 2018, global exports reached USD 19,278 billion, an increase of 9.94% compared to that of 2017 and surpassed USD 18.772 billion of 2014 - a high level of global trade since the 2008 financial crisis.
- Global trade growth in 2018 was mainly driven by rising commodity prices rather than growth in trade volume.
- Trade protection measures tend to increase; however, it is assessed to have a limited impact on global trade flows up to now.

Global Exports, 2012-2018 (billion USD)



Source: WTO Data Portal (2019a)

Global Trade

- Global services exports increased at a relatively high rate of 7.7%
- Africa achieved the highest growth rate, followed by Asia and the Europe. North America had the lowest growth rate.

Growth of Global Service Export, 2013 – 2018 (%)

Region	2013	2014	2015	2016	2017	2018
World	6.60	7.10	-4.69	1.50	8.28	7.70
North America	6.24	5.20	0.95	0.77	5.48	4.08
The Europe	8.33	7.47	-7.78	1.89	8.97	7.89
Asia	4.56	6.90	-2.58	1.39	8.56	9.78
Africa	-4.07	6.26	-4.81	-5.20	13.49	10.86

Source: WTO, 2019a

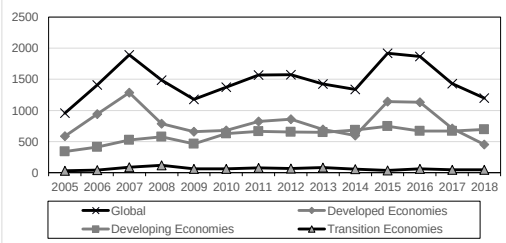
E-commerce

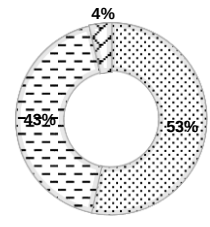
- E-commerce has become the focus of many WTO dialogues.
- E-commerce revenue has increased rapidly. 2017: reached USD 29,000 billion.
- The proportion of online shoppers using social media channels such as Instagram, Twitter, Pinterest, Facebook and Youtuble increased.
- B2C e-commerce market share tends to increase, reaching 2.86 trillion USD in 2018, an increase of 18% compared to 2017.
- The proportion of cross border e-commerce has increased. Buying and selling online from abroad in total B2C e-commerce increased from 15% in 2016 to 21% in 2017.
- China and the US are the two largest e-commerce markets in the world
- Asia-Pacific is the largest B2C e-commerce market, accounting for about 50% of global sales in 2017.
- The strong development of e-commerce has changed the behavior of consumers across the globe, affecting the type of goods and services traded,and creating personalization trends and ways of doing business.

Global Capital Flows

- In 2018, global FDI decreased by 19% to an estimated USD1.2 trillion due to the impact of the TJCA, marking the lowest level since 2007.
- FDI in developed economies decreased by 40% with the sharpest drop in Europe and in the US.
- FDI in transition economies continued to decline in 2018 by 8%
- FDI in developing countries had a modest increase of 3% but it accounted for 58% of global FDI
  - East Asian and Southeast Asian countries account for 1/3 of global FDI due to (i) China is leading the developing countries in the region in attracting FDI and (ii) China is shifting FDI from the US to Asian countries.

Global FDI and FDI by Countries, 2005 - 2018 (billion USD)

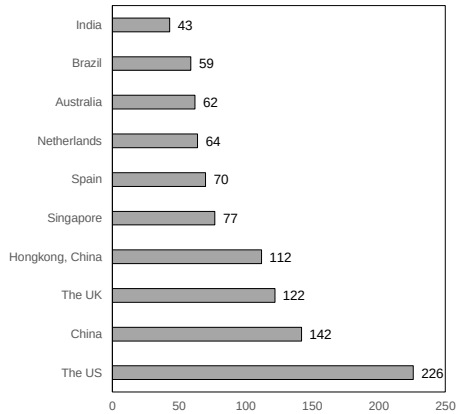




Source: UNCTAD (2019)

Global Capital Flows (cont.)

The Biggest 10 FDI Host Countries, 2018 (billion USD)



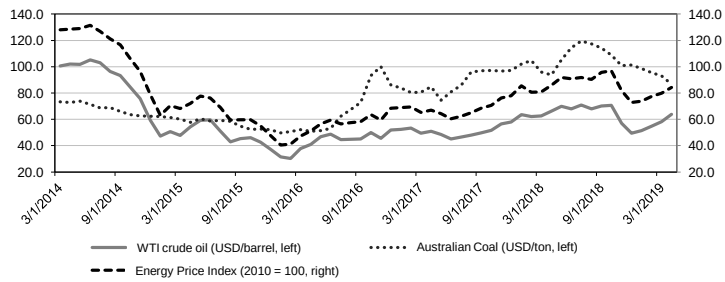
Source: UNCTAD (2019)

- Among the top 10 largest FDI recipients:
  - The US continues to be the world's largest recipient of FDI with $226 billion
  - China ranked 2nd with $142 billion
  - The UK ranked 3rd with $122 billion
  - 04 countries in Asia are China, Hong Kong, Singapore and India
- Regarding investment forms,
  - Total M&A value increased by 19%
  - Total greenfield value increased by 29%
  - M&A values rose sharply in developed countries but quite modestly in developing countries

The World Commodity Prices

- Crude oil price continuously increased from June 2017 to October 2018 and reached the threshold of 70.75 USD/barrel then suddenly dropped sharply in November and December 2018 to USD49.52 USD/barrel due to the fear of supply shortage including (1) OPEC and its allies could not find a solution to compensate for oil shortages from Iran due to US sanctions; (2) demand for crude oil continues to rise; and (3) the situation worsens in Venezuela.

Energy Prices and Energy Price Index, 3/2014 – 4/2019



Source: EIA (2018), WB (2018a)

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Global Unemployment and Jobs

- 2018 marks the third year in a row the global unemployment rate has dropped .The global unemployment rate was 5%, equivalent to 172 million people worldwide were unemployed in 2018.
- The unemployment rates were different among countries.
- The process of reducing vulnerable jobs has been stalled.
- Unemployment rate among young people, gender gap in unemployment rate continued to be a serious problem for the world.
- Labor in service sectors continued to account for a large proportion.
- Digital economy in the context of the 4th industrial revolution will accelerate labor restructuring in many countries in the direction of increasing demand for creative labor, reducing simple labor.

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The 4th Industrial Revolution

- The 'Industry 4.0', also known as the 4th industrial revolution, is a term coined at the Hannover Fair in 2011 by the German government to describe a high-technology strategy and also how it will revolutionize the organization of global value chains (Schwab, 2016).
- While academic research focuses on understanding and defining the concept and trying to develop related systems, business models and respective methodologies; the industry focuses its attention on the change of industrial machine suits and intelligent products as well as potential customers on this progress (Oztemel and Gursev, 2018).

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The 4th Industrial Revolution

- Germany Trade and Invest (GTAI) defines Industry 4.0 as:
- '*A paradigm shift . . . made possible by technological advances which constitute a reversal of conventional production process logic. Simply put, this means that industrial production machinery no longer simply "processes" the product, but that the product communicates with the machinery to tell it exactly what to do.*' (Sniderman et al. (2016): p. 4-5).
- This definition envisages a change in the way the conventional production processes work, that will base on establishing the connectivity between the tangible manufacturing and the digital world. Moreover, there will be a permanent and seamless share of information within and between these 'worlds', so that machines' actions in the production process will be determined by data analyses, by mapping the physical world to the digital world (Popescu and Amza, 2017).

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The 4th Industrial Revolution

- In the words of Alcacer and Machado (2019), Industry 4.0 is '… an interoperable manufacturing process, integrated, adapted, optimized, service-oriented which is correlated with algorithms, Big Data and high technologies such as the Internet of Things and Services, Industrial Automation, Cybersecurity, Cloud Computing or Intelligent Robotics.'
- Oztemel and Gursev (2018) defines it as 'a methodology to generate a transformation from machine dominant manufacturing to digital manufacturing'. In this transformation, machines will be capable of communicating with the human operators.
- Strange and Zucchella (2017) outline Internet of Things, Big data, Robotics, and Additive Manufacturing as the essential features of the Industry 4.0 and believe that adoption of these might disrupt existing configurations of location and control within global value chains.

The 4th Industrial Revolution

- The 4th industrial revolution:
  - Wide range with waves of breakthrough take place simultaneously in many areas.
- Technological drives for the 4th industrial revolution:
  - Material trends: self-propelled vehicles, 3D printing, robotics and new materials, …
  - Digital trends: IoT, blockchain, AI, Big data, …
  - Biological trends: gene sequencing, activating or editing genes, ... when combined with material and technical technologies will greatly affect many sectors of the economy, such as health, agriculture and biomaterial production.

The 4th Industrial Revolution

- The 4th industrial revolution is the amalgamation and interaction of technologies in all areas of the real world, the digital world and the biological world. It provides the following benefits:
  - Time to realize technological innovations in the laboratory and commercialize them on a large scale has been shortened.
  - The smart production process with breakthroughs in many areas → production with very high accuracy, maximizing material savings, minimizing defective rate.
  - The smart production process is connected to a series of digital transactions such as e-logistics, e-banking → distribution and circulation of goods will take place quickly with low transaction costs and high satisfaction of customers
  - Economic activities in all sectors such as industry, agriculture, and services will be nationally and globally connected to optimize resources to produce products that best meet the needs of the market .
  - However, the revolution may lead to deeper polarization between labor groups and countries in the world.

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Prospects for 2019 and Beyond

- Global trade prospects:
  - Global trade in 2019 will increase at a slower pace compared to that of 2018
  - Pessimistic factors: (i) trade restriction measures have more pronounced negative impacts on global trade; (ii) these negative impacts lead to a reduction in investment in many countries, resulting in a trend of repatriation capital back to parent companies in some developed countries and capital flows out of developing countries; (iii) China reduced investment and shifted towards greater domestic consumption while the economic growth of China and the EU slowed down; (iv) orders established in the multilateral trading system after World War II have been weakened and the role of the WTO continues to decline; (v) the unpredictable scenarios, escalation and expansion of the US – China trade war.

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Prospects for 2019 and Beyond (cont.)

- Global trade prospect:
  - The growth of trade in services and the development of e-commerce as a result of the 4th industrial revolution is another important trend.
  - The growth of trade in services will be driven primarily by emerging economies, especially China due to: (i) service-oriented production; (ii) expansion in the middle class leading to new needs from consumers; (iii) the trend of digitizing economic activities.
  - The 4th industrial revolution will also lead the development of e-commerce in the coming years, changes in the global business model. Trends in e-commerce development in the coming years include: (i) strong development through e-commerce applications on mobile phones; (ii) e-commerce trading floors based on cloud applications; (iii) prices are determined on the basis of scientific analyzes using Big data and artificial intelligence to maximize transactions and profits; (iv) the development of electronic money for e-commerce transactions.

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Prospects for 2019 and Beyond (cont.)

- Global FDI prospects:
  - Global FDI in 2019 is predicted to hardly recover from its lowest level since the global financial crisis in 2007.
  - FDI flows into developed countries – the main stimulus for global FDI – has recently decreased.
  - FDI flows into developing countries increased unsustainably and unevenly, focusing mostly in East and Southeast Asia
  - It is difficult to recover the global FDI due to gloomy outlook for the global economy in 2019, increasing potential risks from geopolitics, financial – monetary risks and impacts from big countries' policies.
  - Negative influences of Tax cut and Jobs Act on capital flows will prolong, affecting the scale and structure of repatriations of accumulated foreign earnings by the US MNEs as well as FDI flow into developed countries and global FDI in 2019.
  - Prolonged trade tension between the US and China has weakened production activities, thus has lead to disruption of global supply chains, affecting the global FDI flows.

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Prospects for 2019 and Beyond (cont.)

- International finance: Major economies will be cautious in operating monetary policy.
  - FED did not raise interest rates in March 2019 as previously planned The rates will be maintained in the range of 2.25 - 2.5%.
  - The EU and Japan will maintain record low interest rates in 2019.
  - China will maintain the current interest rates and foreign exchange intervention to make the Yuan weak.
  - With such moves, the US dollar will appreciate against other major currencies in 2019.
- Global oil and non-fuel prices are forecast to decline in 2019 due to decreasing demand, and abundant supply.

Prospects for 2019 and Beyond (cont.)

- Global unemployment and jobs:
  - According to ILO, unemployment rate is expected to slightly decrease to 4.9% in 2019 The total number of unemployed people is estimated at 173.6 million.
  - The number of workers doing vulnerable jobs will continue to increase in the coming years.
  - Digital economy in the context of the industrial revolution 4.0 will accelerate labor restructuring in many countries
    - Creative labor will increasingly occupy a dominant position
    - Simple labor will gradually be replaced by automation systems, intelligent robots.

Prospects for 2019 and Beyond (cont.)

Economic Growth Rate in 2016-2019

% GDP	International Monetary Fund (IMF)				United Nations (UN)			
	2016	2017	2018	2019*	2016	2017	2018	2019*
World	3,2	3,8	3.6	3.3	2.4	3.0	3.1	3.0
Developed economies	1,7	2.3	2.2	1.8	1.6	2.2	2.2	2.1
The US	1,5	2.3	2.9	2.3	1.5	2.2	2.8	2.5
Japan	0,9	1.7	0.8	1.0	1,0	1.7	1	1.4
The UK	1.8	1.7	1.4	1.2	n.a	n.a	n.a	n.a
Europe	1,8	2.3	1.8	1.3	1.9	2.2	2	1.9
Germany	1,9	2.5	1.5	0.8	1.9	2.0	1.8	1.8
France	1,2	1.8	1.5	1.3	1.2	1.7	1.7	1.8
Spain	3,3	3.1	2.5	2.1	3,2	2.9	2.7	2.3
Italia	0,9	1.5	0.9	0.1	0.9	1.5	1.2	1.2
Developing economies	4,1	4.7	4.5	4.4	3.8	4.3	4.4	4.3
China	6,7	6.9	6.6	6.3	6.7	6.8	6.6	6.3
India	7,1	6.7	7.1	7.3	7.1	6.7	7.4	7.6
Russia	-0,2	1.5	2.3	1.6	-0,2	1,8	1.5	1.4
ASEAN-5	4,9	5.3	5.2	5.1	n.a	n.a	n.a	n.a.

Note: ASEAN-5 includes Indonesia, Malaysia, Philippines, Thailand, Vietnam.

Source: IMF (2019a), UN (2019a)

Prospects for 2019 and beyond (cont.)

- Global economic growth:
  - The global economy will face many challenges despite the opportunities of the 4th Industrial Revolution
  - The world economy will witness the gradual reliance of economic growth in developed countries on technology and innovation. The MNEs' FDI will return to developed countries to gain proximity to consumer market and R&D centers.
  - According to OECD, global economic growth in 2019 will increase by 3,5%, lower than the predicted 3,7% last September.

Conclusions and Implications for Vietnam

- Vietnam's economic growth in 2019 will be affected by the slowing growth rate of the world economy, global trade and investment flows.
- Vietnam should identify opportunities and challenges of the US-China trade war:
  - Challenges: higher pressure from trade deficit with China; higher competition in the domestic market when both the US and China can boost exports to Vietnam; greater competition in exporting to the US and China when other countries also want to catch opportunities; the risk that China may circumvent the law in exporting to the US market through Vietnam.
  - Opportunities: increasing exports to the US and China; benefit from changes in the supply chain when foreign enterprises shift part of their production out of China.

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Conclusions and Implications for Vietnam (cont.)

- Other challenges:
  - Increasing global trade barriers, changing supply chains and investment capital flows, tight monetary policies ...
  - Higher reforms are required to implement international commitments
  - Restrictions on technology level put Vietnam in face of many challenges in sustainably developing new trade trends such as digital trade, e-commerce across borders ...
  - The risk of losing jobs, increasing unemployment as the result of the 4th industrial revolution
- Favorable factors: better resilience of the economy, effective CPTPP, economic growth of Korea and EU, prospects of EVFTA, etc.

Good Policy, Sound Economy

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Good Policy, Sound Economy

Overview of the Vietnamese Economy 2018

Contents

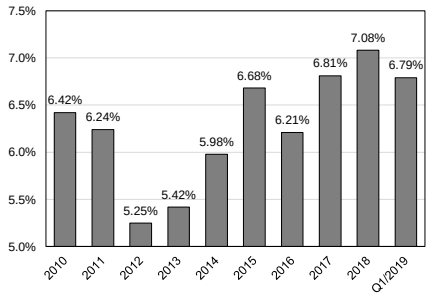
Production and Growth

- Growth in Sectors and Industries
- Employment in Enterprises
- Operation of Enterprises

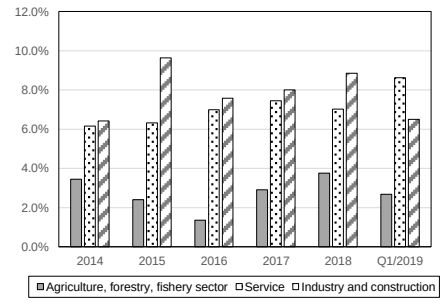
Growth in Sectors and Industries

- Vietnam's economic growth in 2018 was at 7.08%, which met the target set by the National Assembly (6.7%) and was the highest number throughout 10 years.
- Industry and Construction sector and Service sector grew at 8.85% and 7.03%, contributed 3,44 percentage points and 3,02 percentage points to economic growth

Vietnam's Economic Growth, 2010 – 2019 (%)



Economic Growth by Sector in Vietnam, 2014 - 2019 (%)

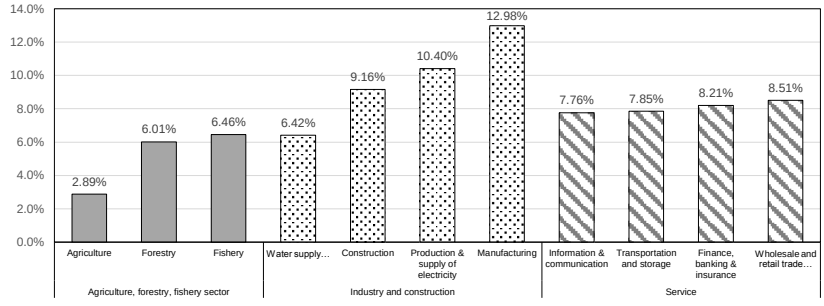


Source: GSO (2019a)

Growth in Sectors and Industries

- The processing and manufacturing industry was the main growth driver to the economy with the highest growth rate of 12.98%.
- The number of international visitors to Vietnam grew 20%, which was equivalent to 15.5 millions of visitors (VNAT, 2019).

Growth by Economic Sectors, 2018 (%)

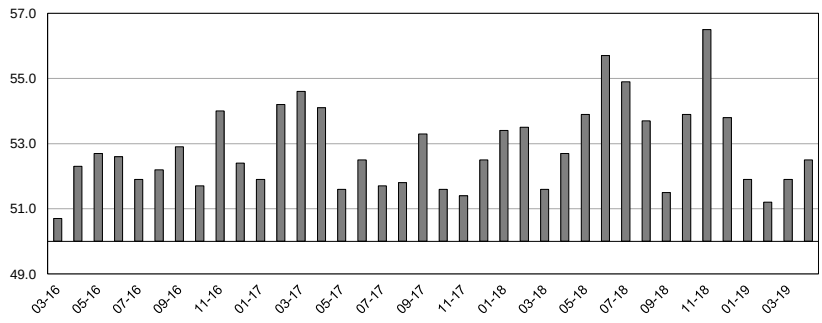


Source: GSO (2019a)

Growth in Sectors and Industries

- PMI continued remaining high in 2018, marked a 37th consecutive month of expansion and helped Vietnam sustain the leading position in the ASEAN regional ranks.

PMI, 2016 - 2019 (%)

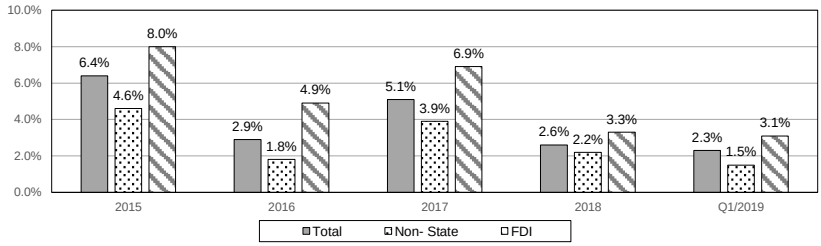


Source: HSBC, Nikkei (2019)

Employment in Enterprises

- 2018 still witnessed a slow pace in labor growth rate that lasted since 2015. The number of labor in non-state enterprises and FDI increased slightly by 2.2% and 3.3% respectively, which was lower than those in 2017
- The application of autonomous machines in production to enhance productivity lowered the labour demand

Growth in The Number of Labour in Industrial Firms, 2015 – 2019 (%)

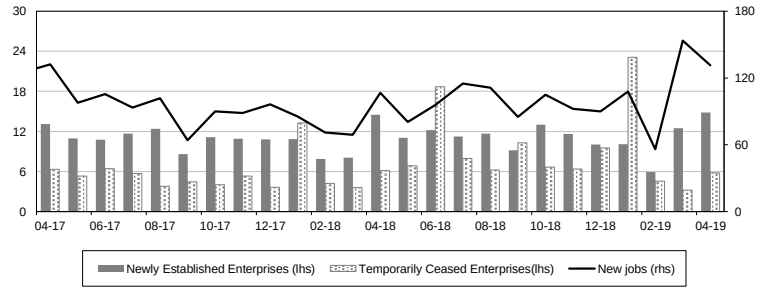


Source: GSO (2019a)

Operation of Enterprises

- In 2018, Vietnam had 131,275 newly registered enterprises, increased slightly 3,5%. The total number of temporarily ceased enterprises was 99,885, up by 51% (yoy) due to the scanning program towards enterprises being inactive but not notified competent authorities.
- The number labor of newly registered enterprises in 2018 was 1,107.1 thousand people, which decreased by 4,7% compared to 2017.

Operation of Enterprises, 2017 – 2019 (th. units, th. people)



Source: GSO (2019a)

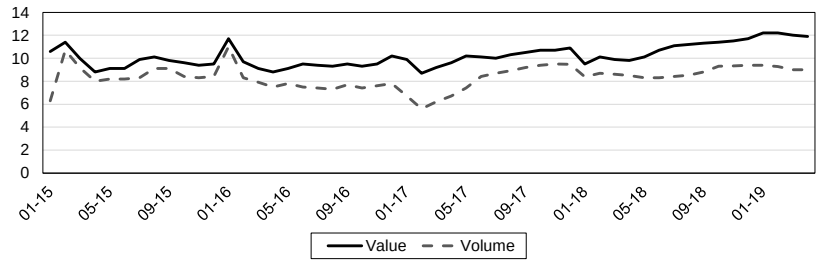
Supply Side

- Retail Revenue
- Total Social Investment
- International Trade
- FDI

Retail Revenue

- Retail sales of consumer goods and services improved considerably in both revenue and volume in comparison to 2017.
- List of essential goods experiencing rapid growth include foods (12.6%); household appliances, tools and equipment (12.3%); and garments (12.4%). Precious stones and material; woods and construction materials achieved high retail growth at 13.8% and 13.7% respectively.

Retail Growth, 2015 - 2019 (%, yoy)

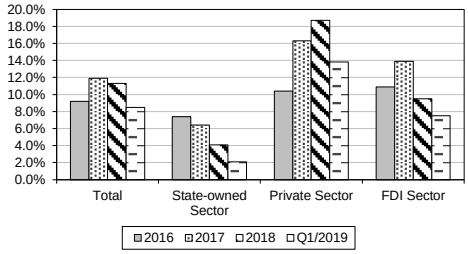


Source: GSO (2019a)

Total Investment

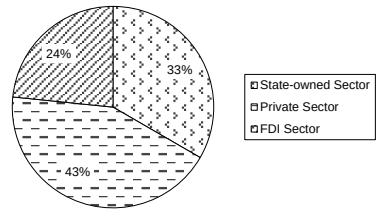
- Total social investment carried out at 2018's current prices increased 17% compared to that in 2017.
- Private sectors accounted for 43% of total investment, reflecting an increasingly important role in the total social investment structure. It is likely to overpass state sectors in term of investment volume.

Total Social Investment Growth, 2016 – 2019 (%, yoy)



Source: GSO (2019a)

Total Social Investment Structure by Sectors, 2018

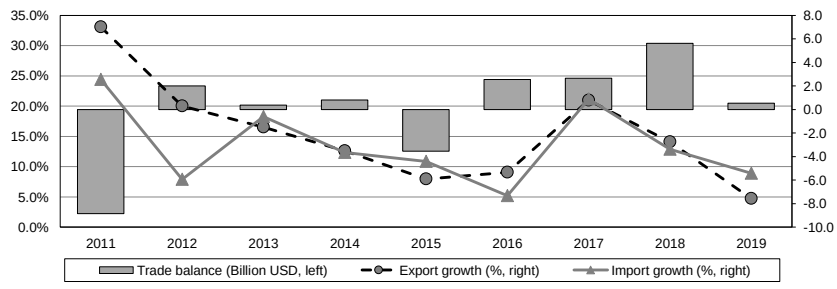


Source: Author's calculation from GSO (2018b)

International Trade

- Trade surplus of 5.6 billion USD was twice as that in 2017. This supported the State Bank to raise national foreign exchange reserves and kept the USD/VND exchange rate relatively stable throughout the year.
- In 2018, export surplus by FDI sector reached 32.81 billion USD. The sector not only did not contribute much to economic growth except employment, but also created economy volatility once FDI firms would confront to any issues.

Annual Trade Balance, 2011-2019

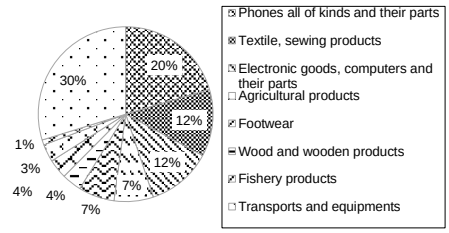


Source: GSO (2019c)

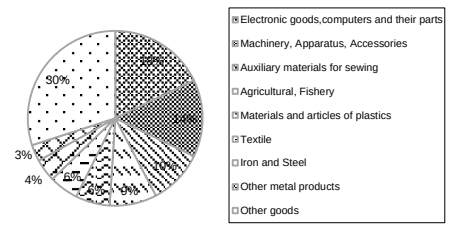
International Trade

- There are 29 products achieving export turnover of more than 1 billion USD and accounting for 91.7% of total export. America was the largest export market with turnover of 47.5 billion USD, up by 14.2%.
- Materials for manufacturing and processing industry continued to dominate 2018 import, reaching 217 billion USD and accounting for 91.4% of the total import turnover. China was still the largest import market with a turnover of 65.8 billion USD, up 12.3% compared to 2017's figure.

Structure of Export by Commodity Group, 2018



Structure of Import by Commodity Group, 2018

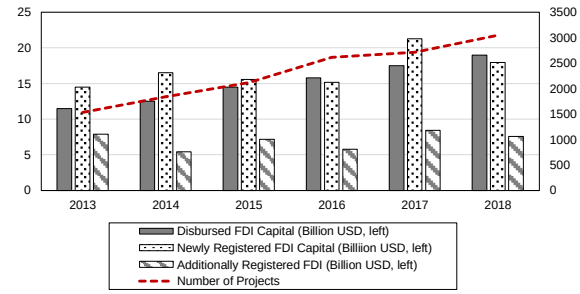


Source: GSO (2019c)

Foreign Direct Investment

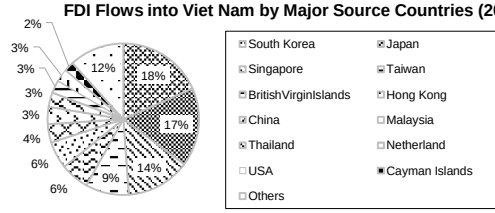
- Total disbursed FDI reached a high level of 19 billion USD in 2018. There are 3,046 newly registered FDI projects, 17.98 billion registered FDI and 7.60 billion additional registered FDI USD in 2018.
- Total registered FDI from FDI was the highest at USD 8.60 billion and 429 new projects. By the end of 2018, Korea maintained the first position in total FDI investment in Vietnam with 62.57 billion USD.

FDI Flows into Vietnam, 2013 – 2018



Source: Author's calculation from GSO (2018b)

FDI Flows into Viet Nam by Major Source Countries (2018)



Source: GSO (2019b)

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Inflation and Monetary Policies

- CPI
- Interest Rate and Credit Growth
- Exchange Rate

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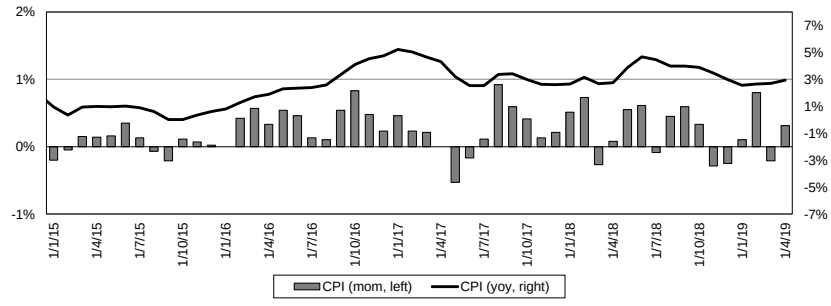
Consumer Price Index

- In 2018, the average CPI increased by 3.54% compared to 2017, within the target of less than 4% of the National Assembly.
- Food sectors contributed greatly to the increase of CPI due to strong recovery in prices. World crude oil prices kept rising and peaked at four years, making energy price increase 0.63% overall.

Consumer Price Index, 2015 – 2019 (%, yoy)

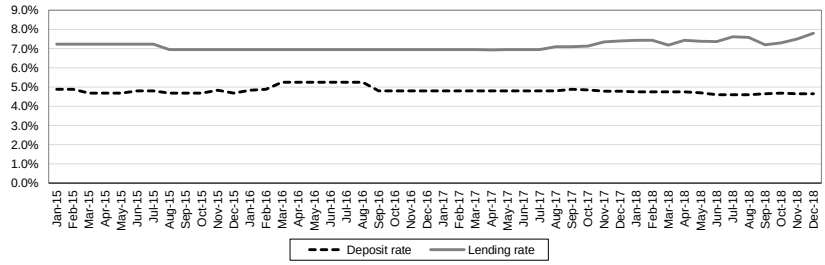


Source: GSO (2019d)

Interest Rate and Credit Growth

- In 2018, interbank interest rates were volatile but followed an uptrend. Deposit rates in commercial banks remained relatively stable at 5-7% per year while lending rates fluctuated within 7-10%.
- SBV stabilized refinancing rate at 6.5% and discount rate at 4.25% from July 2017. Meanwhile, the compulsory reserve ratio for most commercial banks and financial institutions is also stable at 3%.

Deposit and Lending Rate, 2015 – 2018

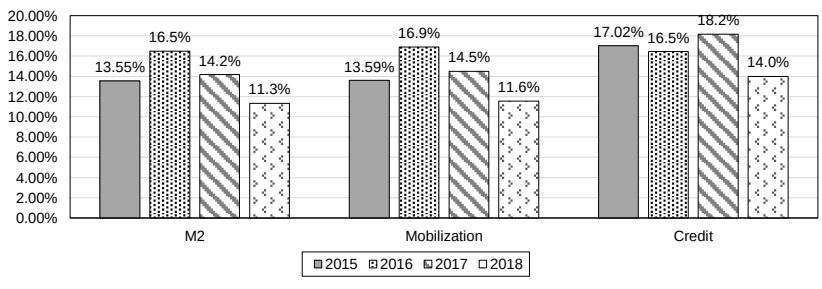


Source: IMF (2019)

Interest Rate and Credit Growth

- The growth of money supply, mobilization and credit were 11.3%, 11.6% and 13.9% respectively, the lowest levels through years. The ratio of M2/GDP reached over 170%, much higher than in previous years such as 2016 (146%), 2017 (165%). → The SBV needs to be more cautious with the growth of money supply in parallel with the threats of high inflation in 2019, especially when the price increase of some essential goods starts to strongly affect the economy.

Growth of M2, Mobilization and Credit, 2015 – 2018 (%, yoy, ytd)

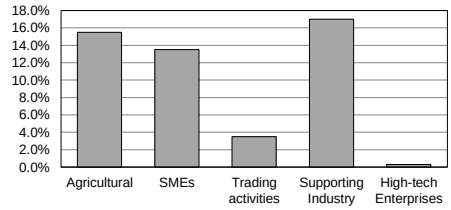


Source: SBV (2019)

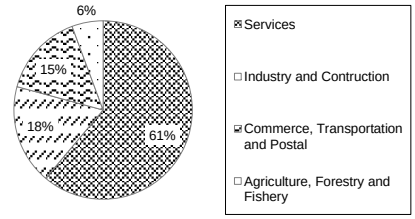
Interest Rate and Credit Growth

- The bond market grew by 15.7% in the whole year. In particular, the corporate bond market increased by 31.6%, reaching a value of up to USD 3 billion. The ratio of outstanding corporate bonds accounted for 8.5% of GDP (compared to 130% of the outstanding credit balance).
- Credit balance in the trade and service sector accounted for the highest proportion. Meanwhile, supporting industries dominated in credit outstanding balance among the priority sectors.

Credit Growth by High Priority Economic Sectors, 2018 (%, yoy)



The Proportion of Credit Balance by Economic Sectors, 2018

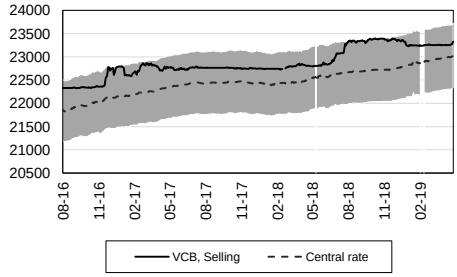


Source: SBV(2019)

Exchange Rate

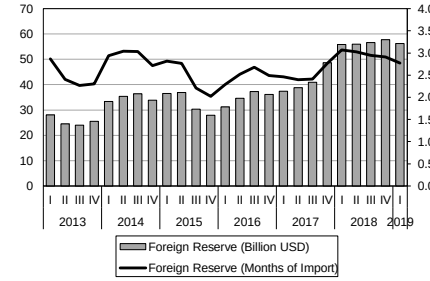
- The exchange rate of VND/USD in commercial banks and SBV increased in 2018, but the fluctuation from commercial banks side was larger. The exchange rate of commercial banks was close to the ceiling of 3% compared to the central exchange rate set by the State Bank.
- Trade surplus of over 7 billion USD, disbursed FDI of 19 billion USD and remittances of 16 billion USD are the core reasons to raise foreign exchange reserves. In 2018, Vietnam bought net over 6 billion USD.

Nominal Exchange Rate (VND/USD)



Source: VEPR compilation (2019)

Foreign Exchange Reserve, 2013 – 2019



Source: CEIC (2019)

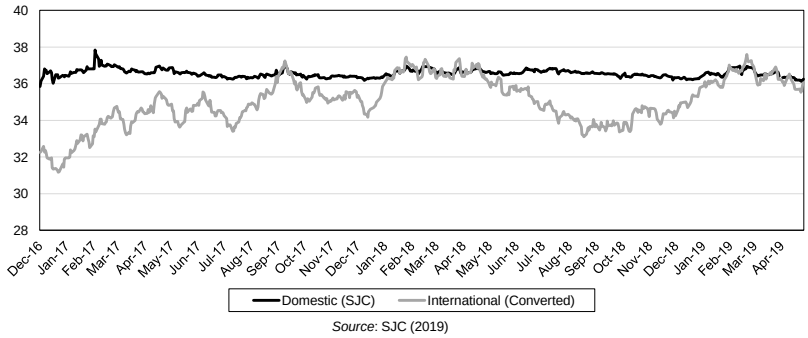
Asset Market

- Gold Market
- Stock Market
- Real Estate Market

Gold Market

- In 2018, while the world price of gold continuously fluctuated over the quarters in 2018, the domestic gold price was relatively stable. → lack of interconnection between domestic and world markets.
- Domestic gold prices slightly fluctuated in the range of 36.2 - 37 million VND/tael in the whole year.

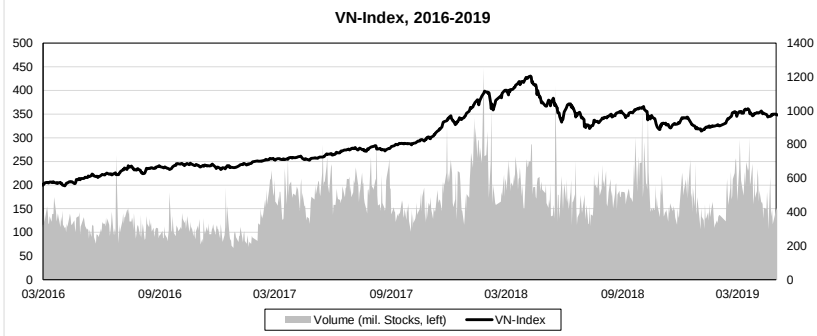
Gold Price, 2017 – 2019 (million VND/tael)



Source: SJC (2019)

Stock Market

- The VN-Index started at 995.77 points and ended at 892.54 points, which was down 10% in 2018.
- In the first quarter of 2018, the market easily conquered the 1,000 point but widely fluctuated in the remaining quarters, reflecting by 38 trading sessions with a margin of greater than 2%

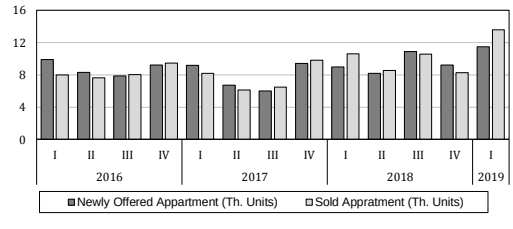


Source: VNDIRECT (2019)

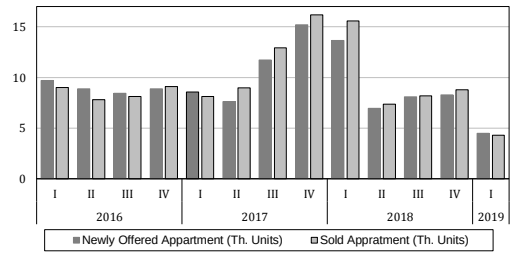
Real Estate Market

- The total number of newly opened apartments and the successful transaction volume in 2018 decreased compared to 2017 ← due to the decrease in supply and negative impacts from the fire in Carina Plaza apartment in Q1/2018.
- Consumption volume decreased by 11% and 12% respectively compared to 2017 in Ha Noi and Ho Chi Minh City.

Apartment Market for Sale in Ha Noi, 2016 - 2019



Apartment Market for Sale in HCM, 2016 - 2019

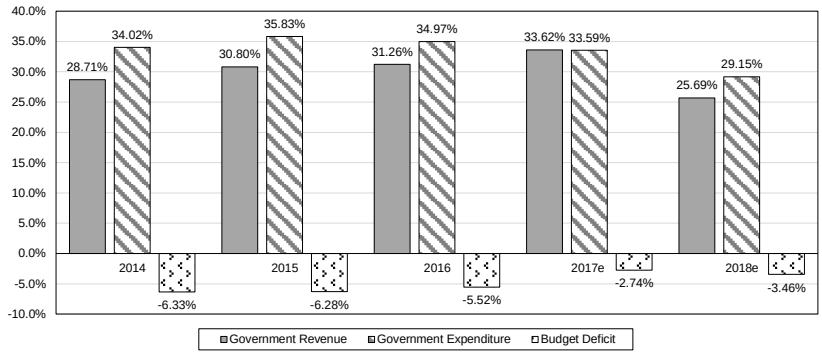


Source: CBRE (2019)

National Budget and Public Debt

- The budget deficit in 2018 was about 191,5 trillion, equal to 3,46% GDP, lower than the estimate by the beginning of this year (3,7%).
- The budget revenue/GDP ratio sharply decreased to 25,7% in 2018

Government Finance, 2014 – 2018 (% GDP)

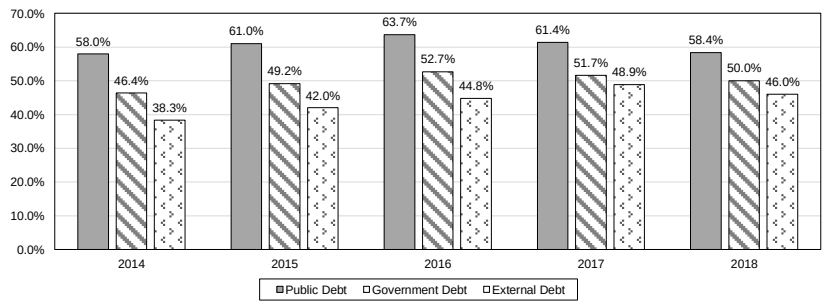


Source: MOF (2019)

National Budget and Public Debt

- The public debt to GDP ratio has decreased to 58,4% in 2018.
- However, it is noticeable that high proportions of recurrent expenditure, persistent budget deficit along with the rapidly increasing debt repayment are concerns in fiscal management.

Public, Government and External Debt, 2014 – 2018 (% GDP)



Source: MOF (2019)

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Conclusions and Implications

- In 2018, despite the volatility of the world economy, Vietnam's GDP growth finished at 7.08% which is the highest note since the financial crisis 10 years ago.
- Economic growth, exporting activity and job creation had great dependency on the FDI sector, especially few major enterprises → posing a substantial risk for environment and enlarging the disparity between domestic and FDI businesses.
- The difficulty in valuing assets and the fear a bearing responsibility causing the stagnant in process of equitization the state-owned enterprises during the last two years.
- The 2018 annualized inflation rate was about 3.54%, however, in 2019, it is subjected to be under fluctuation due to the rising of electricity price → The State Bank of Vietnam is going to closely regulate the money supply, interest rate and credit in 2019.

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Conclusions and Implications

- It is not likely that the interest rate will decrease in 2019 by the virtue of the pressure stemming from the exchange rate and inflation, along with the implementation of more stringent regulation to reinforce the safety of banking system → Accelerate the cost of production
- Vietnam's government is constantly on the verge of increasing the tax rate to finance the budget deficit and meet government's financial obligations. Thereby, Vietnam, different from other countries, is lacking of a fiscal buffer to stand against external shocks.
- In 2019, the Government and its bodies should set gravity on cutting unnecessary business conditions to enhance the business environment
- The State Capital Management Committee should simplify its management system, thereby, it can tackle obstacles and encourage the process of equitization State-owned enterprise. The committee should avoid the unreasonable protection over the SOEs who is more difficult to attaint operation efficiency in comparison to the private sector.

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Conclusions and Implications

- There will be more opportunities offered to Vietnam because of the transition of FDI flows into Vietnam in order to take the advantages of multilateral FTAs such as CPTPP and EVFTA and mitigate the risks arising from the US – Sino trade dispute → It is essential to improve the business and institutional environment and the quality of labor force.
- The government should revise tax incentives and land leasing condition offering to FDI sector in order to redress the balance in doing business between FDI and domestic sector.
- Vietnam should focus on fiscal, monetary and exchange rate policy to protect the economy against the volatility of the world economy:
  (1) Flexibly monitoring exchange rate
  (2) Stabilizing the interest rate
  (3) Declining the leverage and alleviate financial distress in the banking system
  (4) Gradually construct the fiscal buffer by simplifying the government system and reducing the current expenditures

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Good Policy, Sound Economy

Vietnam's Future Digital Economy

Main Contents

- Vietnam Digital Imperative
- Megatrends Shaping Vietnam's Future Digital Economy
- Vietnam's Future Digital Economy - Scenarios for 2030 and 2045
- Ways Forward

Vietnam's Future Digital Economy Projects

Trends of the Macro and Digital Economy

Megatrends and Scenario Planning

Industry Case Studies
Agriculture, Manufacturing

Conclusions and Resilience Recommendations

Methodology

Trend Identification

Horizon scanning to identify political, economic, social, technological, legal and environmental trends

Data Analysis

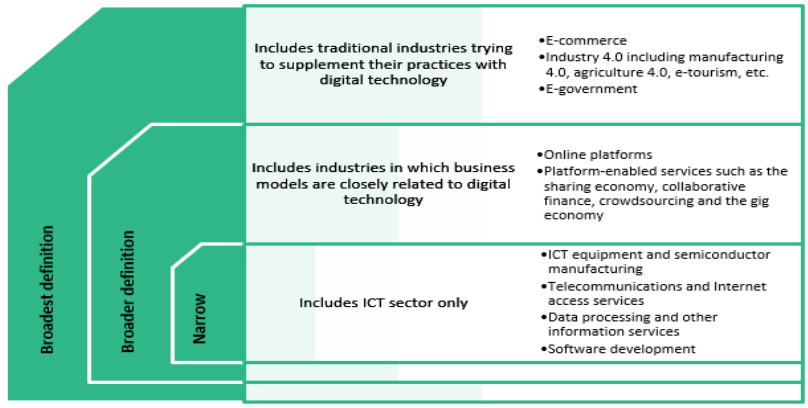
- Interviews
- Workshops
- Economic modelling

Futures Analysis

- Megatrends driving the digital economy to 2040
- Scenarios of Vietnam's digital economy in 2040

Digital Economy – a Definition

- The report adopt the broad definition of digital economy



Vietnam in International Rankings

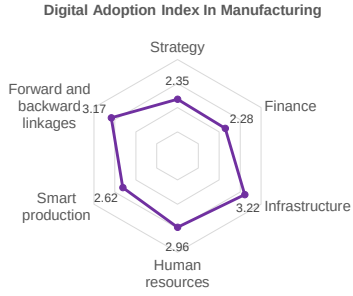
	Indicators	Year	Vietnam	Indonesia	Thailand	Philippi
Business and Innovation	**Ease of Doing Business Index** (out of 190 nations)[10]	2018	69th	73rd	27th	124th
	Global Innovation Index (out of 126 nations)[11]	2018	45th	85th	52nd	82nd
	Nation Brand Rankings (out of 100 nations; current US$ billion)[12]	2018	43rd $235	16th $848	31st $509	29th $524
	Logistics Performance Index (out of 160 nations)[13]	2018	39th	46th	32nd	60th
Human Resources	**Global Talent Competitiveness Index** (out of 125 nations)[14]	2019	92nd	67th	66th	58th
	English Language Proficiency Index (out of 88 nations)[15]	2018	41st	51st	64th	14th
	Workers at High Risk of Job Automation by 2025 (%)[16]	2016	70%	56%	44%	49%
Digital Infrastructure	**ICT Development Index** (out of 176 nations)[7]	2017	108th	111th	78th	101st
	Global Cybersecurity Index (out of 193 nations)[17]	2017	101st	70th	20th	37th
	Average Download Speeds (out of 200 nations; Mbps)[18]	2018	75th 6.7 Mbps	83rd 5.8 Mbps	40th 17.1 Mbps	89th 5.2 Mbps
	Inclusive Internet Index (out of 86 nations)	2018	43rd	49th	31st	54th
	Population with Internet Access (% of population)[9]	2016	46.5%	32.3%	52.9%	55.5%
Digital Economy	**Number of Internet Users** (millions)[19]	2018	64	132.7	57	67
	E-commerce market size (US$ billions at 2015 prices)[20]	2015	$0.8	$1.3	$0.9	$1
	High Technology Exports (current $US billions)[9]	2016	$43.6	$3.9	$34.7	$26.1
	E-Government Index (out of 193 nations)[21]	2018	88th	107th	73rd	75th

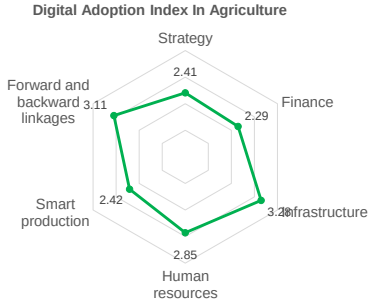
Survey Results on Digital Adoption in Agriculture and Manufacturing

- **Information technology use across industries:** A majority of businesses have applied information technologies in their production activities (except for agriculture households but adoption is limited to everyday business management and customer and supplier contact through email and websites
- **Emerging technology trends:** real-time analytics and sensors are considered as having greatest impact in agriculture. On the other hand, technologies directly related to production are most appreciated, including process monitoring and control, robotics, and automation technology are most improtant to manufacturing firms
- **Motivations and barriers to adopt digital technologies:** The most commonly stated motivation is to reduce input costs, increase productivity and enhance business management. Unclear economic benefits and uncertain impacts of technology adoption, and the prohibitively high investments are still important challenges.
- **Vision and strategy:** Most enterprises surveyed were examining option for further digitisation of processes, although a negligible proportion actually have developed detailed plans or allocated funds for digital adoption.

Digital Adoption is Still Low in Traditional Sectors

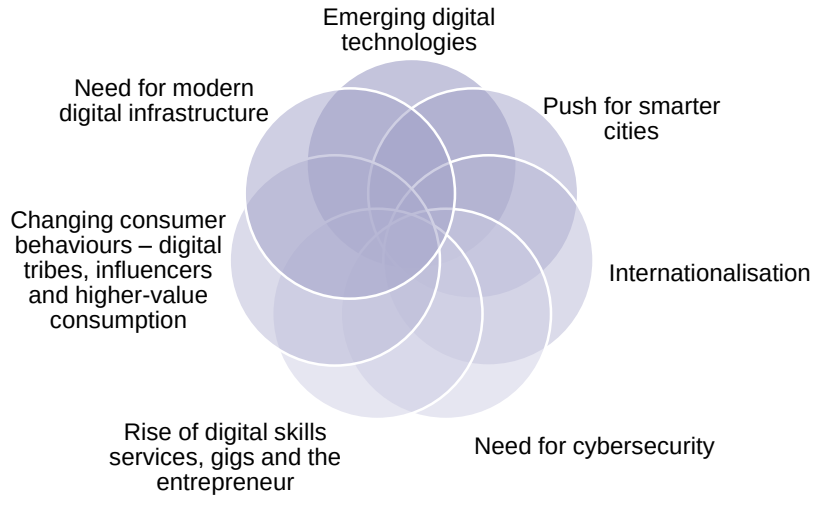
Digital adoption levels across dimensions in Vietnam's leading companies





Source: Analysis by Data61 and Ministry of Information and Technology

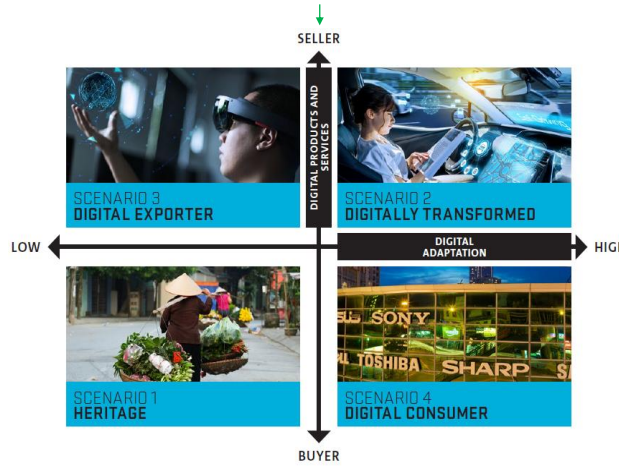
Megatrends that Shape Vietnam's Digital Economy



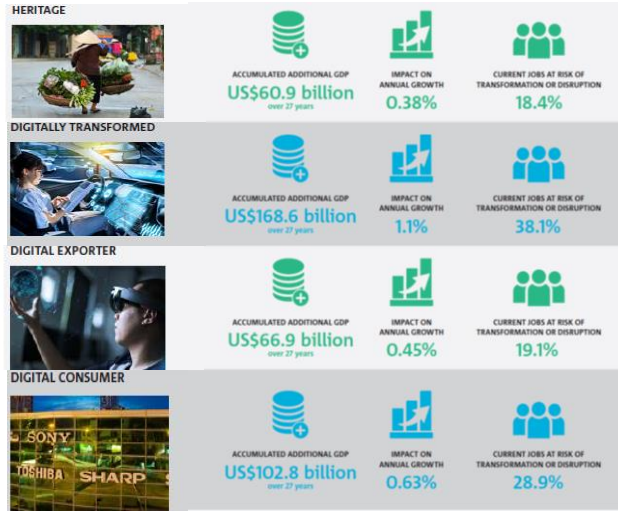
Scenarios For Vietnam's Future Digital Economy

Representing the impact of the **Internationalisation** megatrend

Representing impact of the **Emerging Digital Technologies** megatrend



Digital Adoption is still Low in Traditional Sectors



Scenarios - Digitally Transformed

1.1% increase on annual growth
Leading in digital technology development

Key features:

- **The intellectual property system develops**: technologies such as blockchain improve IP protection and accelerate innovation. National wealth is created through IP
- **Open innovation, open data**, and other channels increase access to data and allow content creation.
- **Investment in significant high-tech parks:** a strong innovation system has boosted collaborative innovation and joint-venture projects, both internally and with other countries.
- **Strong and prudent investment in research and development** means Vietnam becomes an emerging leader in selected specialist digital technologies
- **Vietnam's digital sector booms** on both domestic work and external contracts
- **Industries across Vietnam transform** using digital technology

A strong innovation system together with key research centres will facilitate projects and partnerships to commercialize R&D within Vietnam and with international partners.

Scenarios - Digital Exporter

0.45% increase on annual growth
Low cost wages attract digital work from other countries

- **Vietnam's digital industry booms** on self-taught coders making US dollars in doing work for other countries
- **Platforms facilitate access** to Vietnam's labour market and global buyers
- **Concentrated investment** in skills and higher education
- **A strong innovation system has not matured** so innovation projects, foreign aid and technical development remain opportunistic and unco-ordinated – meeting the needs of external players rather than Vietnam's own development goals.
- **Skilled workers often lured offshore**
- **Patent protection** has improved but still doesn't allow for wealth through IP to be retained within the country.

Scenarios - Digital Consumer

0.63% increase on annual growth
Industry transformation through digital tech

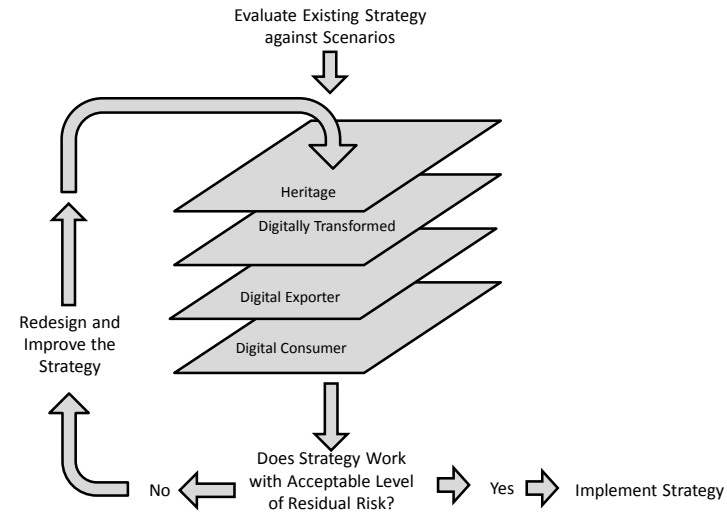
- **Vietnam's industry adopt digital tech developed overseas –** resulting in rapid industry transformation
- **Vietnam's ICT industry still small**
- **Broad investment** in skills and higher education – but skills development is outpaced by demand.
- **National innovation system** – focussed heavily on industry partnerships, and implementation of new technology across industry sectors – particularly agriculture and manufacturing
- **Active and strongly implemented 4.0 Industry policies –** create incentives for Vietnam businesses to modernise
- **High-value agriculture**, **mining and manufacturing** are improving the output value of Vietnam's industries on the back of the rising Asia's middle-classes
- **Rapid automation** in many areas has resulted in areas of high-unemployment and large internal migration to cities.

Scenarios - Heritage

0.38% increase on annual growth
Low productivity and low digital capacity

- **Low investment in skills, infrastructure and industry modernisation**
- **Vietnam's competitiveness is loses ground** as FDI moves to other countries
- **Low innovative capacity** through lack of investment and loss of IP wealth
- **National innovation system** is patchy, unified and under-funded. Cannot focus on breakthrough innovation, which goes offshore to be developed.
- **Industry** is increasingly controlled by foreign interests and the informal economy has grown.

How Should Policy Makers Use Scenarios?



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Way Forward
Avoiding the Middle-income, Low-wage Trap

Low income	**Middle income**	High income
		
Lower-cost wages	⟷	Science and tech industries.

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How did the "Asian Tigers" become High-income?

- High export growth and industrial reform
- Rapid and inclusive growth
- **Caught up technologically** and applied science and technology to improve productivity across all industries
- Stable and reliable rule-of-law
- High investment in the health and education of populations
- Sound macro-economic management – low external debt, low inflation, stable economic indicators

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Time to Change Strategy in Vietnam

LOW INCOME COUNTRIES	MIDDLE INCOME COUNTRIES	HIGH INCOME COUNTRIES
Market development strategy	**Investment-led strategy**	**Innovation-led strategy**
Export focus, investment attraction, enabling education and infrastructure, foreign FDI, development of manufacturing	Technology adoption, transfer and imitation across industry	Technology *development*, R&D and wealth from IP generation and products and services at the technological frontier
Labour-market led-growth	*Total factor productivity-based growth*	*Knowledge-based growth*

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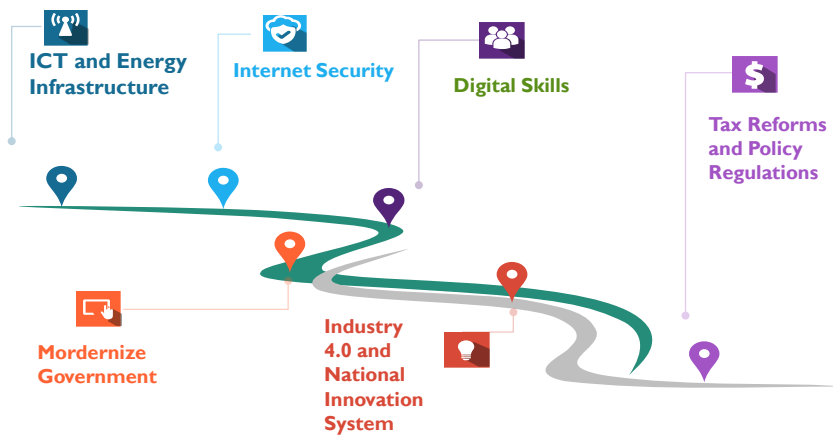
Pillars in Developing the Future Digital Economy in Vietnam



Digital-enabled Infrastructure

Some recommendations include:

• Review the current state of Vietnam ICT and energy infrastructure

• Improve connectivity across the nation, particularly in rural and remote areas.

• Review spectrum plans and allocations based on capabilities of new wireless systems such as 5G

• Explore different methods to finance new infrastructure investment

• Pilot multiple smart city systems and create 'urban living labs' across urban environments

Cyber Security

Some recommendations include:

- Actively collaborate with international organization in cybersecurity and data governance
- Develop cyber security capability in the labour force
- Appoint an independent, trusted and high-profile e-safety Commissioner to take complaints, provide cybersecurity tools and training
- Monitor and ensure public data is available on hacks, data breaches and notifications
- Enhance cyber security, especially in critical systems such as finance, energy, health and transport

Digital Skills

Some recommendations include:

- Coding, STEM and computer skills in schools
- Develop Industry Boards to better align formal education with the needs of industry
- Invest in advanced computing and coding capacity – particularly those associated with other industry sectors in Vietnam
- Enhance the linkage between education and industry by encouraging internships among senior tertiary students

Modernise Government

This can help:

- Reduce costs of service at the same time as providing contracts for ICT development
- Use the opportunity to leapfrog existing technologies and build new industries

Some recommendations include:

- Promote Mission-led challenges, hackathons, sandpits, trials and partnerships
- Open Data and Open Innovation Platforms
- Undertake decision-framework and multi-criteria analysis on public sector spending priorities
- Create digital registers of public assets – recording size and value for both trust-building and efficiency

Taxation and Legal Regulation

- Some recommendations include

• Review current regulations

• Be proactive in examining the impacts of regulations on new digital technologies by undertaking analysis on impact of the changes on digital development

• Encourage public participation in regulation debate on digital economy

• Actively participate in legal and other frameworks for digital economy development and data flows in the Asia Pacific region

Conclusions

"With a young and vibrant population, high investment and a location in the heart of high-growth Asian economies, Vietnam has a good chance of surging forward with the new digital tools available, if the transition is managed well"

- Science and technology investment in digital provides an opportunity for Vietnam to increase annual GDP growth by 1.1% till 2045 .

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Vietnam's Participation into the Global Value Chains in the Context of the 4th Industrial Revolution

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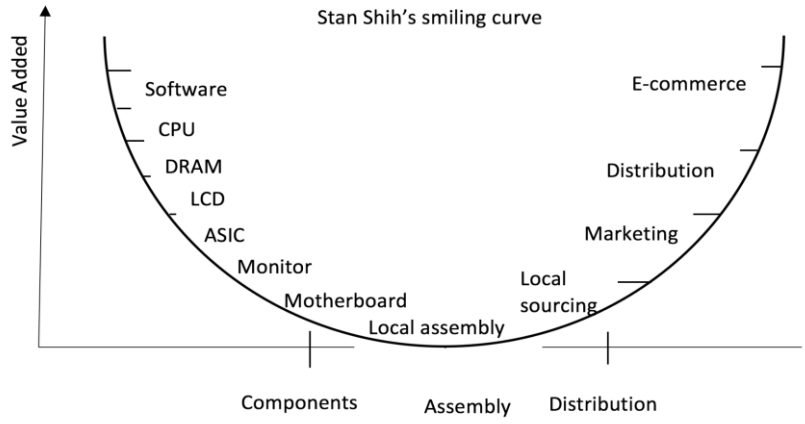
The Global Value Chains

- When looking at the configuration of the global value chains, we need to divide and analyze the chain through all the activities from upstream to middle stream to downstream stages.
- Different activities will bring different values to participating businesses.
- Stan Shih (1992), used the Smiling Curve to illustrate the added value that businesses get from participating in the various stages of the value chain.

The Global Value Chains



Source: Stan Shih (1992)

The Global Value Chains

- Mudambi (2008) continued to develop this model to illustrate the phenomenon commonly seen in companies in emerging countries advancing higher value processes in GVCs.
- Local businesses, after joining GVCs, would access to resources and improve capacity through pervasive effects from upstream businesses in GVCs, so that they could control and enter into higher value stages (Mudambi, 2008, p. 708).
- This phenomenon was called catch-up, which occurs when businesses shifted from producing tangible goods to intangible assets.

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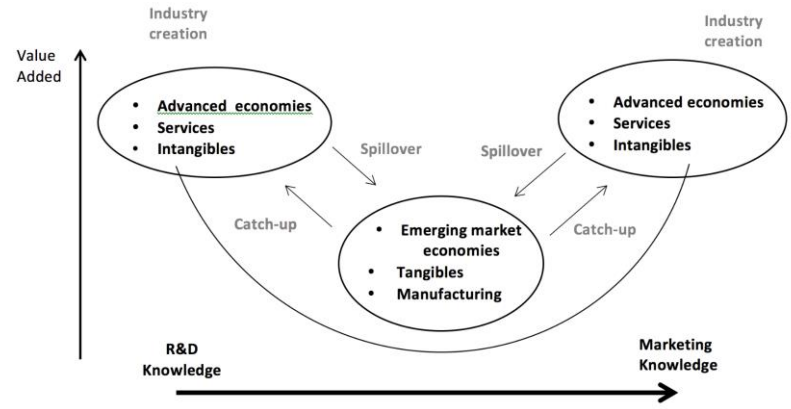
The Shift in the Smile Curve



Source: Stan Shih (1992)

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Vietnam in the GVCs

- Vietnam's openness to trade and investment, becoming the central places in the global trade (Herr et al., 2016).
- Vietnam has emerged as an Asian manufacturing powerhouse, specializing in assembly functions primarily led by foreign firms (Nakamura, 2016).
- The manufacturing and processing industries have dominated the export values with 42 percent and 40 percent shares in 2017; in comparison with 11 percent and 41 percent respectively in 2006 (GSO, 2017).
- This leap accredited to the strategic orientation of Vietnam on exporting medium and high-tech products such as telephones, computers, ….
- Thanks to the manufacturing giants such as Samsung Electronics, LG Electronics, IBM, Nokia, and Intel...
- Manufacturing giants imported intermediate products from their subsidiary companies located abroad, contributing in the backward participation of Vietnam in GVCs.
- Vietnam also has remarkable GVCs participation in foods, beverages, textile and footwear..

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Vietnam in the GVCs

- GVCs provides Vietnam with job creation, specialization on a certain stage of global production, and spilling-over of the technology and management skills through local learning (Taglioni & Winkler, 2016).
- However, benefits from participating in GVCs are not automatic. Benefits vary considerably depending on ***participation through backward linkages or through forward linkages***, and on ***the position of the reference country on the value chain***.
  - A country, which predominantly assembles the intermediate products into final goods and subsequently export them will have a strong backward participation but a small forward participation.
  - A country, which predominantly supplies domestically produced intermediate products to an assembler, will have a strong forward participation but a small backward participation.

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Vietnam in the GVCs

- The trade structure of Vietnam shows that the proportion of intermediate products in import structure is larger (47.9 percent) than the proportion of the same in its export structure (GSO, 2017) ➔ ***Vietnam has stronger backward participation than forward participation in global value chains***.
- Relying on I2E (importing-to-export) pattern of economic growth, Vietnam has consistently achieved higher economic growth for over a decade, reaping the benefits in terms of job creation, foreign reserves, and improving living standard….
- However, how long Vietnam can sustain this growth model?
- To answer this question, we analyze two main threats to the sustainability of the export-led economic growth.
  - Firstly, the inherent bottleneck in the export-led growth model
  - Secondly, the pattern of Vietnam's GVCs participation

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Inherent Bottleneck in the Export-led Growth Model

- The overall exports pattern of Vietnam portrays its following the footsteps of export-led growth model of Mexico, whereby it has also turned itself into export production platforms for foreign multi-nationals by suppressing the wages, rather than developing own indigenous industrial capacity.
- This export-led growth strategy is different from the one adopted by Germany or Japan or Asian Four Tiger countries or China. These countries' export strategies led to enhance their own industrial capacity.
- The Mexico model was considered less successful so far: Sluggish GDP growth, unchanged labor productivity has been, and total factor productivity growth has been negative.
- With the rising living standards, ultimately the comparative advantages of cheap labor force would vanish in the future, which means a wave of assembly jobs would flow out of Vietnam leaving masses of workers without jobs.

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The Pattern of Vietnam's GVCs Participation

- GVCs participation of Vietnam has increased significantly, mainly led by growing backward linkages in computer and electronics, textile and footwear, foods and beverages, and electrical machinery. These industries are also positioned in the middle-stream activities of the value chain ➔ large contribution in the gross exports value, but less in domestic value added.
- This can be interpreted in two folds:
  - Firstly, Vietnam is specializing as the assembly platform,
  - Secondly there is prevalence of foreign companies in the distribution and marketing channels of those highly integrated industries.
- A better scenario: The assembling platform strategy should be bonded with the strategy to develop own indigenous industrial capacity, and national technological base.
- These will help Vietnam to upgrade activities along value chains in forms of:
  - Product upgrading,
  - Process upgrading,
  - Functional upgrading, and/or sectoral upgrading so that it can switch Vietnam goals 'assembling agent' to 'indigenous producer'.

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The Position of Vietnam in the GVCs

- In this section, two aspects of global value chain have been discussed:
  - Participation of Vietnam in global value chains
  - Position of Vietnamese industries on the value chain.
- Koopman et al. (2010) have proposed the measurement of "GVCs participation index" for a reference country "i" and industry "k" as below:
- GVCs Participation index = IDC*ik/GE + FVAik/GE (1)
  - IDC^*_{ik}: The reference country's domestic value-added content in the exports of buyer countries to the third countries,
  - FVA_{ik}: The foreign value-added embodied in the exports of the reference country.
  - GE: Gross exports of the reference country.

VEPR

The Position of Vietnam in the GVCs

- The first term on the right-hand side actually measures the industry's forward participation. The second term measures the industry's backward participation of the reference country in global value chains.
- By "forward participation": measured as the share of domestic value added contained in the export of such intermediate goods or services, in the gross exports of the reference country.
- By "backward participation" measured as the share of foreign value added embodied in the gross exports of the reference country.
- However, the above equation does not shed ample light on how to locate the position of a reference industry or country on the value-added curve (the smiley curve).
- In regard to locating an industry on the smile curve, the recent empirical trade literature has set out many indicators, the most relevant are:
  - The "GVCs position index" approach by Koopman et al. (2010)
  - The "Distance to final demand" approach by Fally (2012).

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The Position of Vietnam in the GVCs

- The “GVCs position index” is a log ratio of an industry’s (or a country’s) forward participation index to its backward participation index.
- The ‘distance to final demand’ is an index that measures how many production stages a product still requires to undergo before it reaches the final consumers.
  - A long “distance to final demand” suggests that an industry is positioned upstream in the production process.
  - A short “distance to final demand” suggests that the industry is positioned downstream in the production process.

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The Position of Vietnam in the GVCs

- We adopted the “GVCs position index” approach as the primary technique to locate the position of a reference industry since this approach also sheds light on the way an industry participates in global value chains.
- **GVCs position index = LN[1+(IDC*ik/GE)] – LN[1+(FVAik/GE)]** (2)
- If the GVCs position index for an industry takes a positive value, it means it lies upstream, while if index value takes a negative value, the industry lies downstream.
- However, one limitation - that is, it does not separate the industries that lie in the higher-upstream from the ones that lie in the lower-upstream industries, or separating the higher-downstream and the lower-downstream industries on the smile curve.
- The term “middle-stream” for the segment on the smile curve lying from the lower upstream to the lower downstream part.

VEPR

The Position of Vietnam in the GVCs

- To overcome this situation, we computed the standard deviation of the industries' yearly position indices, then this standard deviation value was once added to, and the next subtracted from Vietnam's average position index of the same year, assuming the normal distribution of the GVCs position indices.
- Once these were done, thus a range was created covering one standard deviation upward and one standard deviation downward from the average position index. We have considered this range as the range for the "middle-stream industries".

VEPR

The Position of Vietnam in the GVCs

- ***Three rules for categorizing the position of industries on the smile curve are:***
  - Rule 1: An industry with the GVCs position index above the "average position index plus one standard deviation" lies in the upstream.
  - Rule 2: An industry with the GVCs position index below the "average position index minus one standard deviation" lies in the downstream.
  - Rule 3: An industry with the GVCs position index that falls in between the "average position index plus one standard deviation, and the average position index minus one standard deviation" inclusive lies in the middle-stream.

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Participation in Global Value Chains

- In 2015, GVCs participation rate of Vietnam is 56 percent which is a significant jump in comparison to just 34 percent in 1995. However, increment comes from backward participation that shares 45 percentage points and the forward participation contributes only 11 percentage points. Moreover, the contribution of forward participation has been weakening since 2000.

Index on the Participation in GVCs of Vietnam

Year	Forward participation	Backward participation	GVCs Participation
1995	12.6	21.6	34.2
2000	19.5	27.2	46.7
2005	14.5	36.1	50.6
2010	12.5	40.5	53.0
2015	11.1	44.5	55.6

Source: Author's calculation based on OECD.stat data(2019)

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Participation in Global Value Chains

Industry	ISIC	GVCs Participation	Forward participation	Backward participation
Agriculture, forestry and fishing	D01T03	31.9	0.2	31.7
Mining and quarrying	D05T09	30.6	0.3	30.3
Food, beverages and tobacco	D10T12	38.3	0.7	37.6
Textiles, apparel, leather and related products	D13T15	47.4	1.2	46.2
Wood and paper products; printing	D16T18	49.0	0.2	48.9
Coke and refined petroleum products	D19	33.0	0.6	32.4
Chemicals and pharmaceutical products	D20T21	48.8	0.7	48.1
Rubber and plastic products	D22	53.5	0.3	53.2
Other non-metallic mineral products	D23	35.7	0.1	35.6
Basic metals	D24	46.5	0.4	46.1
Fabricated metal products	D25	59.1	0.2	58.9
Computer and electronics products	D26	64.0	1.7	62.3
Electrical equipment	D27	59.5	0.5	59.0
Machinery and equipment	D28	64.1	0.6	63.5
Transport equipment	D29T30	56.0	1.3	54.6
Wholesale and retail trade	D45T47	25.3	0.5	24.8
Transportation and storage	D49T53	33.9	0.6	33.4
Accommodation and food services	D55T56	28.5	0.2	28.3
Information and communication	D58T63	35.8	0.1	35.7
Financial and insurance activities	D64T66	20.5	0.1	20.4
Manufacturing	D10T33	57.1	8.9	48.2
Total business sector services	D45T82	30.2	1.7	28.5
Vietnam	TOTAL	55.6	11.1	44.5

Source: Author's calculation based on OECD.stat data(2019)

VEPR

Position on the Value Chain

- In terms of position on the value chain, none of the industries are located in the upstream position (GVCs position indices of all industries are negative).
- Only two industries including other transport and wholesale and retail trade have taken on the larger negative indices and are thus positioned downstream.
- Rests of the industries including crucial industries for Vietnam such as textile and footwear, electronics and electric, automotive etc. are positioned in the middle-stream on the value chain.

VEPR

Position on the Value Chain

Industry	ISIC	GVCs position index	Position on the value chain
Agriculture, forestry and fishing	D01T03	-0.27	Middle-stream
Mining and extraction of energy producing products	D05T06	-0.26	Middle-stream
Mining and quarrying of non-energy producing products	D07T08	-0.26	Middle-stream
Mining support service activities	D09	-0.26	Middle-stream
Foods, beverages and tobacco	D10T12	-0.17	Middle-stream
Textiles, wearing apparel, leather and related products	D13T15	-0.31	Middle-stream
Wood and products of wood and cork	D16	-0.31	Middle-stream
Paper products and printing	D17T1	-0.37	Middle-stream
Coke and refined petroleum products	D19	-0.40	Middle-stream
Chemicals and pharmaceutical products	D20T2	-0.40	Middle-stream
Rubber and plastic products	D22	-0.37	Middle-stream
Other non-metallic mineral products	D23	-0.36	Middle-stream
Basic metals	D24	-0.28	Middle-stream
Fabricated metal products	D25	-0.39	Middle-stream
Computer, electronic and optical products	D26	-0.42	Middle-stream
Electrical equipment	D27	-0.30	Middle-stream
Machinery and equipment	D28	-0.41	Middle-stream
Motor vehicles, trailers and semi-trailers	D29	-0.37	Middle-stream
Other transport equipment	D30	-0.46	Downstream
Wholesale and retail trade; repair of motor vehicles	D45T47	-0.49	Downstream
Transportation and storage	D49T53	-0.42	Middle-stream
Accommodation and food services	D55T56	-0.42	Middle-stream
Publishing, audiovisual and broadcasting activities	D58T60	-0.45	Downstream
Telecommunications	D61	-0.40	Middle-stream
IT and other information services	D62T63	-0.21	Middle-stream
Financial and insurance activities	D64T66	-0.37	Middle-stream
Real estate activities	D68	-0.23	Middle-stream

Source: Author's calculation based on OECD.stat data(2019)

Conclusions

- 85 percent of industrial enterprises in Vietnam still remain outside Industry 4.0 revolution, and only 13 percent are at the beginner level (MIT and UNDP, 2019) → It has not yet witnessed the impact of technology in the workplace.
- Nevertheless, adoption of robotic automation has already started penetrating some industries including automobile, computer and electronics, electrical equipment etc → Sooner or later, advances in technology will start affecting Vietnam.
- Given the growth model of Vietnam and its position in global value chain, the risk to economy may arise in two possible ways:
  - Firstly, MNCs may exit Vietnam in search of skilled labor force, or to place manufacturing plants close the customers' markets;
  - Secondly, enterprises will automate the manufacturing process laying off substantial amount of low skilled laborers.

Conclusions

- The first risk is less likely to impact; however, the second risk seems inevitable. In this context, a priority focus on skills and workforce readiness is critical for VN.
- A closer collaboration between policymakers, employers and training institutions to modernize skills development system (ILO, 2016).
- Moreover, an effective development strategy calls for expanding sectors that generate more value-added and employment, with large multiplier effects and upstream and downstream linkages to the domestic economy (ILO, 2018).
- Moving from backward linkage to forward linkage, more participation in the upstream and downstream.
- From GVC follower to GVC governors, and owner of GVC with intellectual properties

Implications for Viet Nam

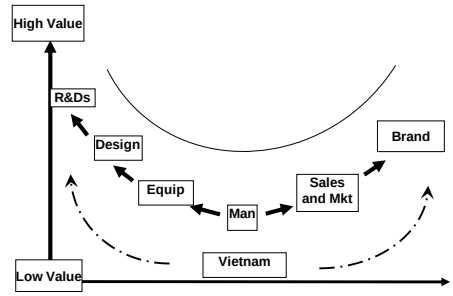
- An ILO country report (2016) shows that about 17 percent of the total 54 million labour force are engaged in the manufacturing sector alone in Vietnam, of which textile and footwear contributes 36 percent and electronics and electric sector make up nearly 5 percent.
- Though the current prospects for these two sectors are strong, however, in the medium and long-term, advances in new technology and automation could bring significant changes.
- ILO (2016) estimates that 86 percent of all wage workers working in textile and footwear sector will face a high risk of automation.
- Most electronics and electric factories in Vietnam target low-value production and low-skilled assembly work, with a focus on integrated circuits, semiconductor devices, and printed circuit boards.
- Given the repetitive nature of assembly work in this sector → a high proportion of wage workers (around three in four) are at high risk of automation in the coming decades (ILO, 2016).

Implications for Viet Nam

- On the other hand, the scenario in the agriculture sector is quite encouraging in which adoption of mechanization and automation would contribute to the productivity and the diversification of the rural economy of Vietnam (ILO, 2018).
- The automotive, and food and beverage industries that have high degree of product variants will also benefit from a greater degree of flexibility. And the industries such as semiconductors, pharmaceuticals, foods and beverage that demand high quality will benefit from data-analytics of the 4th industrial revolution (BCG, 2015).
- Software Industry has strong forward linkage but only at middle stream, working as sub-contractors for foreign companies (ITCnews, 2019).
- Meanwhile, Manufacturing has strong backward linkage (opposite of Software Industry).
- If their positions are exchanged → Vietnam would be more beneficial in the GVCs.

Implications for Viet Nam

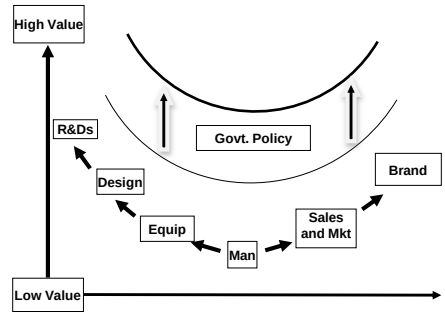
In the long-run, IR 4.0 will leverage → Vietnam may get out of the trap named “middle stream”, move up to both upstream and downstream stages.



Source: Nguyen Viet Khoi, 2013

Implications for Viet Nam

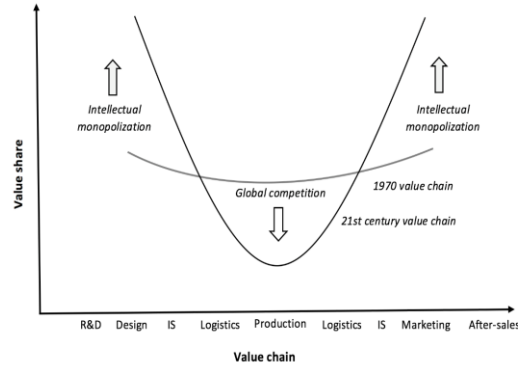
- In the short-run, Vietnam is still in the Middle stream.
- Technology can embeded in the current stage, lifting up the smiley curve.
- Same stage but higher added value



Source: Nguyen Viet Khoi, 2013

Implications for Viet Nam

- GVCs is not as flat as it used to be.
- The distance among stages of production will be shortened.
- The added value will be more different.



Source: Nguyen Viet Khoi, 2013

Good Policy, Sound Economy

VEPR

Application of Big data in Macroeconomic Statistics

Using Online Data for Inflation Nowcasting

VEPR

Contents

VEPR Introduction

- **Big data in macroeconomic statistics**
- Macroeconomic statistics play an important role: to serve in open discussions, provide a basis for policy and business decisions, support scientific activities… but only if the reliability of the statistics is guaranteed
- The advent of Big data creates new directions for collection and computation of macroeconomic data, providing opportunities to build statistical system that reflects reality in a more timely manner. For example, GDP can be published monthly instead of quarterly, CPI can be released weekly instead of monthly.

VEPR Introduction

- **Inflation measurements**
- **The measure of inflation** is the inflation rate, the percentage in which a common price index (usually the Consumer Price Index - CPI*)* changes every year (Mankiw, N. Gregory, 2002).
- **Measuring problems**: Inflation should be *adjusted in time*, by modifying the *relative weights of the corresponding goods in the basket* – how current goods and services are compared to goods and services in the past. New products may be introduced, old products may disappear, the quality of current products and consumer preferences may change. Both goods and services included in the basket and its weighted prices need to be updated to keep up with the movement on the market.

VEPR Introduction

- **Big data and inflation: inflation nowcasting**

- **Economic Nowcasting** imply the instantaneous monitoring of macro variables (in short time periods, for example, days or weeks) and the ability to make forecasts instantaneously. This term is created by replacing the prefix *for-* in "forecast*"* by *now-*.
- **Inflation Nowcasting:** Monitoring prices and forecast inflation in a short period. A price index that is previously published monthly can be computed weekly or even daily.

VEPR Introduction

- **The potential of inflation nowcasting**
- **The advantage of online data:** high frequency that allows for real-time estimation of inflation
- **The growing popularity of e-commerce** allows more data to be available to collect

Some Projects that Collect Online Data and Nowcast Inflation

STT	Project names	Organization
1	Automatic price collection on the internet: Using web scraping and web Crawlers for price index compilations	Statistics Austria
2	Using scanner data for consumer prices	Statistics Belgium
3	Using web scraping price data for price index of e-commerce	China - National Bureau of Statistics
4	Using scanner data for compilation of CPI	Statistics Denmark
5	Multipurpose consumer price statistics: sub-project Scanner Data	European Commission - Eurostat
…	…	…

Source: Global Working Group - GWG

VEPR

Methods of Calculating The Consumer Price Index (CPI)

Traditional methods of CPI computing

- **Survey method**: **Direct survey** in each province/city with 572 items and services stipulated specifications, grades and labels.
- **Calculation method:** The **national CPI** is the weighted average between CPI of economic regions with corresponding weight of each region in comparison to the whole country. **Regional CPI** is aggregated from the price index of each provinces/cities with their corresponding weights. **Provincial CPI** is calculated by the weighted average between the price index of different commodity groups with corresponding weight, according to the fixed base period

→ **Disadvantages: Costly, complicated and prone to slow updates. This lead to (1) A burden on resources of state agencies (2) misleading statistical indicators (3) Demand for faster and more accurate statistics**

VEPR

Methods of Calculating The Consumer Price Index (CPI)

Calculating CPI using Big data

- Using **scanner data**, data from **webscraping** and **price data from mobile applications** to compile price indexes → allow price indexes to be effectively aggregated without relying on knowledge and experience of statisticians (Nobuhiro and Kimiaki, 2018).
- There are not many previous studies underlying this method. The earliest contribution is by Lunnemann and Wintr (2006), who found the difference in price between online and normal (physical) stores in Europe and the United States. So far, the Billion Prices Project initiated (MIT, 2013) is the largest project focused on web data scanning and online price analysis (Cavallo and Rigobon, 2016).

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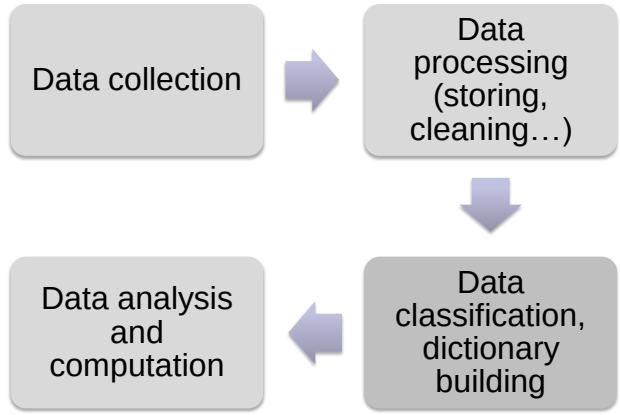
Methods of Calculating The Consumer Price Index (CPI)

Calculating CPI using Big data

Our research follows previous literature on Big data analysis procedures from Talavera, Gorodnichenko and Sheremirov (2018).



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Methods of Calculating The Consumer Price Index (CPI)

Calculating CPI using Big data

- **Data collection**: using **web-scraping** techniques in Python, a programming language to build automated price collecting procedures from online sellers daily (eg: lazada.vn). Each observation includes the name of the item, the list price - before and after discounts, sorting the item according to the categorization on the website and the date the data was collected.
- **Data management** (storage, cleaning ...): extract and store pieces of relevant information into the database as csv files. Each file contains data of a website in a day. This daily collection and storage procedure started in April 2018. Afterwards, the raw datasets are cleaned (keep the numeric characters and remove miscellanous characters in the price collected...).

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Methods of Calculating The Consumer Price Index (CPI)

- **Calculating CPI using Big data**
  - **Dictionary building, Data classification**: build a **dictionary** that links products of each website with the classification categories in the CPI basket of goods of the GSO. Stored data will be categorized according to this dictionary.
  - **Raw data processing and calculation**: time series of prices are aggregated into weekly prices (the prices that appear in the most days are chosen as the representative price of the product for that week, for a particular website) and omit temporary discounts, also known as v-shaped sales.

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Methods of Calculating The Consumer Price Index (CPI)

- **Calculating CPI using Big data**
  - **Data analysis and computation**

The Online price index - OPI implements a variation of the Laspeyres formula:

$$I^t = \sum_{i=1}^{n} W_i \times dp_i^t$$

For each group of commodity *i* that includes *s* products:

$$dp_i^t = \left(\prod_{j=1}^{s} \frac{p_j^t}{p_j^{t-1}} \right)^{\frac{1}{s}}$$

The Online Price Index (OPI)

- **Data descriptions**

Data are collected from week 15/2018 to week 12/2019 (from 09/04/2018 - 24/3/2019), including 7 billions products from more than 40 online sellers in Vietnam

Number of Goods Collected by Each Group of Commodity

Group of commodity	Number of products	Percentage (%)
Household equipment and appliances	2.292.898	33.01%
Garment, hats and footwear	1.268.839	18.27%
Culture, entertainment and tourism	1.019.761	14.68%
Transportation and communication	535.123	7.70%
Food, foodstuffs and services	160.459	2.31%
Medicine and health-care services	118.882	1.71%
Education	91.211	1.31%
Housing, electricity, water, fuels and building materials	27.602	0.40%
Beverage and tobacco	19.934	0.29%
Other goods and services	1.293.239	18.62%
Not classified	117.774	1.70%
Total	**6.945.722**	**100.00%**

Source: VEPR

Good Policy, Sound Economy

The Online Price Index (OPI)

- **Data descriptions**

Number of Goods Collected by Each Website

No.	Group of commodity	Number of Items	Percentage (%)
1	lazada.vn	5.569.319	80.18%
2	adayroi.com	332.970	4.79%
3	shopee.vn	281.080	4.05%
4	sendo.vn	230.480	3.31%
5	vatgia.com	124.673	1.79%
6	yes24.vn	107.999	1.55%
7	tiki.vn	96.656	1.39%
8	meta.vn	17.471	0.25%
9	vuivui.com	15.009	0.21%
10	chopp.vn	13.237	0.19%
	Others	156.828	2.25%
	Total	**6.945.722**	**100.00%**

Source: VEPR

The Online Price Index (OPI)

- **Data descriptions**

Prices Distributions by Categories of Items

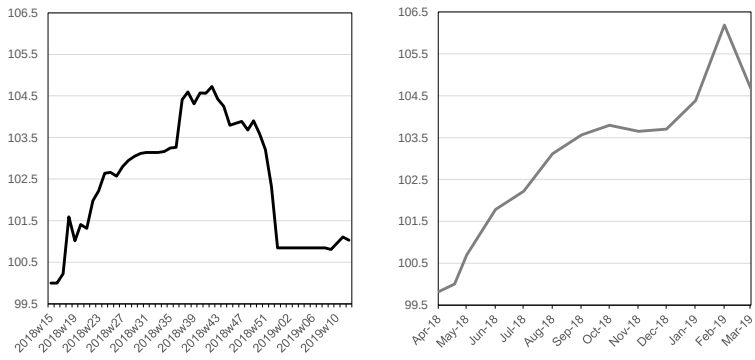
Group of commodity	Log10 of price		Percentile				
	Mean	Standard Deviation	5%	25%	50%	75%	95%
Household, equipment and appliances	5,38069	0,53318	4.000	101.000	200.000	439.000	2.999.400
Culture, entertainment and tourism	5,37366	0,48628	8.000	103.000	208.000	450.000	1.830.000
Garment, hats and footwear	5,27533	0,35165	9.000	105.941	190.000	325.000	715.000
Transportation and communication	5,26161	0,46226	2.000	90.000	168.000	312.000	1.850.000
Beverages and tobacco	5,13319	0,42092	9.000	68.000	135.000	269.000	700.000
Food, foodstuffs and related services	5,03934	0,42839	3.000	54.300	110.000	225.000	550.000
Education	4,99009	0,40350	4.000	52.000	89.000	181.000	505.000
Other goods and services	5.24463	0.36793	4.000	98.000	174.000	545.000	786.453

Source: VEPR

The Online Price Index (OPI)

- **Online price index: Food, Foodstuffs and Related Services**

OPI (Left) And CPI (Right) for Food, Foodstuffs And Related Services

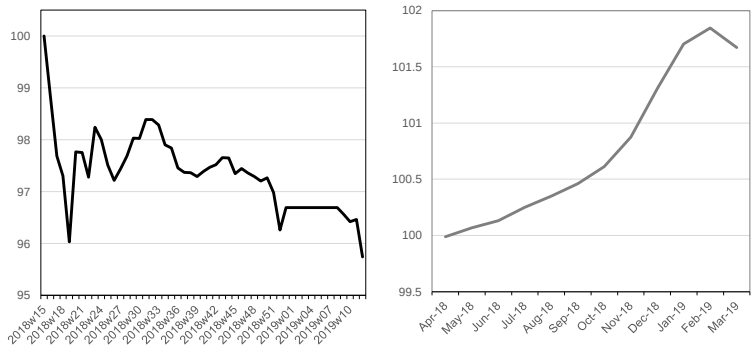


Source: VEPR

The Online Price Index (OPI)

- **Online price index: Garment, Hats and Footwear**

OPI (Left) And CPI (Right) for Garment, Hats And Footwear

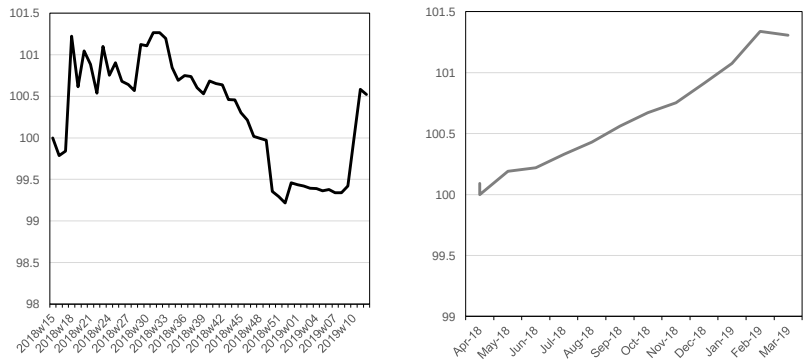


Source: VEPR

The Online price index (OPI)

- **Online price index: Household, equipment and appliances**

OPI (Left) And CPI (Right) for Household, Equipment And Appliances

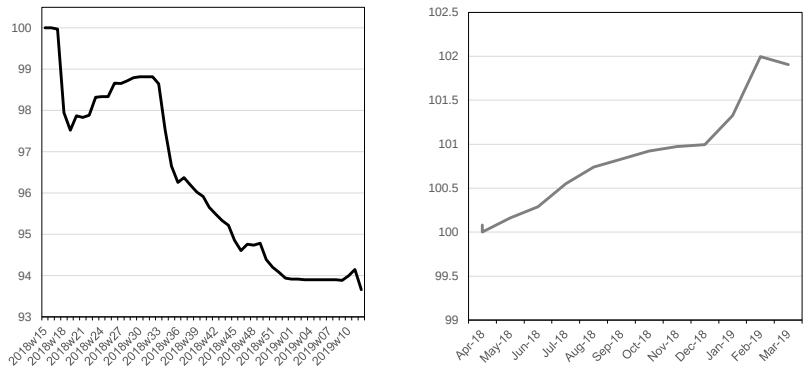


Source: VEPR

The Online Price Index (OPI)

- **Online price index: Culture, entertainment and tourism**

OPI (Left) And CPI (Right) for Culture, Entertainment And Tourism



Source: VEPR

Conclusions

- Using Big data to compute macroeconomic statistics is still in the testing phase and cannot completely replace the traditional methods. However, by using a large amount of data ignored by the old methods, these new methods are able to improve accuracy, increase index generation frequency and remove burdens from statisticians and reporting companies (Nobuhiro and Kimiaki, 2018).
- This research has successfully tested automatic data scraping and storing, Big data processing and compiling an online price index (OPI) for several groups of commodity that are being sold online.
- Potential to expand the scope of research: by collecting data from other countries and forming an international dataset, we can compare the price movements of a commodity or commodity group worldwide, thereby making relevant economic or business decisions.

Vietnam's Economic Prospects in 2019 and Policy Implications

Notable Macro Risks

- Vietnam has been depending heavily on the FDI sector. Our Import structure still focuses on machinery, equipment, components and raw materials for export → It is necessary to solve the problems of "supporting industries", "processing economy", and find solutions to overcome the "processing economic trap".
- Inflation in 2019 is expected to become more difficult to control as the impacts of the recent energy price adjustment on consumer prices has just begun and will continue for many months to come.
- Persistent budget deficit with many potential fiscal risks → The need to introduce new taxes or increase old taxes may ensued
- The increasing US – China trade war tension brings new pressures that will put Vietnam at risk of more serious trade deficit from the Chinese market.

Prospects for 2019

Vietnam Growth and Inflation in 2015-2018 and Estimation for 2019

Year	2015	2016	2017	2018	2019	
					Scenario 1	Scenario 2
Growth (%)	6,68	6,21	6,81	7,08	**6,56**	**6,81**
Inflation (%)	0,60	4,74	3,53	3,54	**4,21**	**4,79**

Source: VEPR

Short-term Policies

- Shifting mindset to promote growth from traditional resources like natural resources and making use of low-cost labor towards science and technology innovations; build a transitional platform for the digital economy in the future.
- The Government needs to monitor recurrent expenditures closely, maintain transparency, and avoid waste in using public investment. To effectively allocate government budget, legal documents should be issued in the direction of assessing the output and the final result of public expenditures instead of focusing on input monitoring and procedure controlling.
- The majority of the private sector, with the exception of a few that are relying on personal relationships to develop, have not been well-established and are subject to many barriers from the domestic institutional and business environment. For those reasons, the Government should continue to accelerate reforms to truly operate as a Tectonic State.

Medium to Long-term policies

- Two fundamental factors:
  - Legal environment
  - Education system
- Objective: Humans need to the master their machines, not to be enslaved by them
- On law making: Until we are able to build a true system of rule of law, implementing Intellectual Property Rights in a strict manner should be a priority.
  - This will help form a class in society that live by their own knowledge and creativity. They will be the pioneers in our 4.0 society.
- On education reforms: eliminating monopolies in syllabus and textbooks, creating a real educational market.
  - The success of the reform requires a prerequisite condition of an effective Intellectual Property law just mentioned.

Medium to Long-term policies

- To step forward to the future of a digital economy, the Vietnamese Government should prioritize on investing in the following areas (i) ICT infrastructure and energy infrastructure; (ii) network security and data management capabilities enhancement; (iii) digital skills improvement for the workforce; (iv) Digital Government and Open Data implementation; and (v) tax reform promotion and the current legal framework improvement.
- Promote Big data application in economic statistics to enhance early warning capacity to ensure macroeconomic stability.
- Adjust policies to help upgrade Vietnam's participation in the value chain include product upgrades, process upgrades, functional upgrades, and industry-wide upgrades, thus shift Vietnam's roles from "installation intermediaries" into "manufacturers".

VEPR

Thank you!
Q&A

For further discussions please email to:
Email: nguyen.ducthanh@vepr.org.vn
Vietnam Institute of Economics and Policy Research,
School of Economics, Hanoi National University
P.707, E4, 144, Xuan Thuy, Cau Giay
Email: info@vepr.org.vn
Tel: 04.37547506 ext 714/ 0975608677
Fax: 04.37549921