Financial development in emerging countries: fintech, the new wave of development and the financial future (singapore as a model)

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Abstract:

Financial services have witnessed major changes in recent years, especially in the wake of the 2008 financial crisis, with regard to the growth of financial technology institutions and the trend of economies towards digital transformation with the slogan **"Faster services, broader options with less cost"**. in this context, this paper aims to present the successful Singaporean model in adopting financial technology and achieving a qualitative leap in the development of the financial sector through a statistical study of the strategies and incentives provided to this sector.

The results of the study showed that the government's prudent and ambitious monetary policy, as well as the great openness to the outside, short-term financial flows, and foreign direct investment, led to the dynamism of the real sector, and the development of the Singaporean financial sector. In turn, the strength and development of the financial industry has contributed to monetary stability and economic development in Singapore, where financial technology showed an important role in accelerating and diversifying financial services and reaching a wide segment of society.

Keywords: financial services, financial technology, financial sector, monetary stability, economic development, Singapore.

Jel Classification Codes: O11 ;E42 ;O53.

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Introduction:

Financial development is one of the fundamental and critical factors for achieving sustainable economic development, This stability-related development depends to a large extent on the quality and effectiveness of reforms at all levels of the financial sector structures. In fact, the developed financial sector affects and is affected by the real sector during boom and bust period, and this influence has prompted governments to confirm their fiscal policies and strengthen the financial infrastructure with the aim of implementing measures that support the financial system, and achieve the ultimate goal of macroeconomic policies. Especially after the global crisis of 2008, which led to the decline of traditional financial services, paving the way for the rise of financial technology companies in emerging countries such as China, India, Brazil ... etc, and strengthening them in developed countries, that monopolize technology in order to contain more shocks and accelerate and expand financial services at a lower cost On the hand, and On the other hand, transactions and digital currencies are among the best financial technology products, which have developed in a short period, and allowed investors to maximize their wealth, which may lead to thinking about abandoning traditional currencies in the future.

In addition, Singapore is considered one of the leading countries in the field of financial technology and financial innovation for adopting new development strategies. As a first step in building a modern financial industry, and distinguishing the main sectors that can be relied upon in this industry to internationalize and diversify financial services.

What we mentioned above prompted us to study and analyze certain aspects of this new and unique experience, which represent the intersection of technology and finance, by identifying the strategies and means it has adopted to develop its financial sector and adopt financial technology.

The research issue can be formulated from this point of view as follows: What is the reality of the financial sector in Singapore? and How has financial technology contributed to improving traditional financial services and achieving economic development?

To answer this question, this research will address not only the development of the financial sector (monetary authority, legislation, infrastructure ...etc), but will extend to the interaction of technology with financial sector. The rest of the paper is structured as follows, after introduction, the part 1 Eat A brief reading on the concept of Financial Technology (Fintech). The part 2 Touched on Singapore's Financial Sector: The Intersection of Finance and Technology. presents Part 3 the Financial Sector from the Lens of Macroeconomic in Singapore. Last part was left to conclude this research.

1.Research importance

The importance of this research lies in identifying the reality of Singaporean financial sector, and the vital role of Fintech enterprises by providing permanent sources of financing for economic development operations.

2.Research objectives

This paper carried with it several objectives, the most important of which is to know the impact of technological development in the aspect of financial services and the change that occurred in the financial sector in light of technology.

And for representation and citation, we took the experience of Singapore to know the strategies and ways it has adopted in the field of technology investment in financial services, so that it has become an example and a lesson for other countries that can be emulated.

3.Research Methodology

The issue that we address in this paper, leads us to follow a descriptive approach in analyzing and evaluating the Singaporean experience in the field of financial sector and financial technology.

4.Previous studies

In the scope of the integration between financial sector and technology, the study of (Ridzuan, et al., 2017) focussed on the factors that help in structuring a strong financial sector, and it assessed the role of foreign direct investment (FDI) and technology in; economic growth, income distribution, and environmental quality by incorporating quarterly data from 1970-2013, and using Autoregressive Distributed Lag (ARDL) estimation technique. this study concludes that FDI, and high technology, and trade openness lead to higher economic growth and better environmental quality.

(varga, 2018) study presented the basic concepts of financial technology and taking note of its organizational aspects, the added value to it, and it's global economic, social and environmental importance in light of the low costs, ease of use and financial expansion.

More recently, a report of (ICAEW & ISCA, 2018) shows that the development of high-tech industry has increased the efficiency and coverage of financial services including payments, insurance, lending, and capital in ASIAN countries. As a result, many countries seek to be a center for innovation in high-tech.

I. A Brief Reading on the Concept of Financial Technology (FinTech)

Fintech, is a term used in financial sector to depict companies that implement new technology. Many Fintech companies are small to medium-sized companies that do not necessarily own a large number of stocks but have a good understanding of how to launch new technologies in the financial services industry or how to develop existing services. These firms have taken a prominent trend by the end of 2010.

From the point of view of (Saksonov & Merlino, 2017, p. 962) there are two main factors that contributed to the formation of financial technology companies. The first factor is dated to the 2008 global financial crisis after it showed flaws of traditional banking to customers. The second one relates to innovations that have revolutionized technology, prompting countries to digitize financial transactions and strive to make services accessible to a wider segment of society, faster and easier, while reducing the cost of these services and developing them over time.

The existence of FinTech companies is also linked to their integrated environment. We can infer from the speedy growth of high technology worldwide that the establishment of advanced foreign and domestic companies in research and development in new technologies props the provision of existing or new financial services (Shakib, 2013, p. 668), and helps emerging companies that use information technology channels to support consumer services such as payments. Moreover, training institutions combine financial services and research in the field of information technology, which facilitates the work of technological cooperation centers that bind between research and education. (McCabe, 2020, p. 6). The value of this environment is reinforcement through the foundations of Fintech ecosystem in which the demand of participants in financial technology is covered by the following pillars: (SFA & EY, 2018, p. 6)

Pillar 1: the desire of customers to acquire financial technology and their ability to achieve it through the provision of Internet and smartphones to reduce time to access financial services, and their willingness to enter into agreements with fintech institutions to build digital infrastructure;

Pillar 2: to ensure the sustainability of FinTech institutions is ought to find alternative permanent sources;

Pillar 3: Reliance on financial education and highly qualified human resource;

Pillar 4: set an open regulatory environment includes all measures related to the financial sector like legislation, the general regulatory environment and competition;

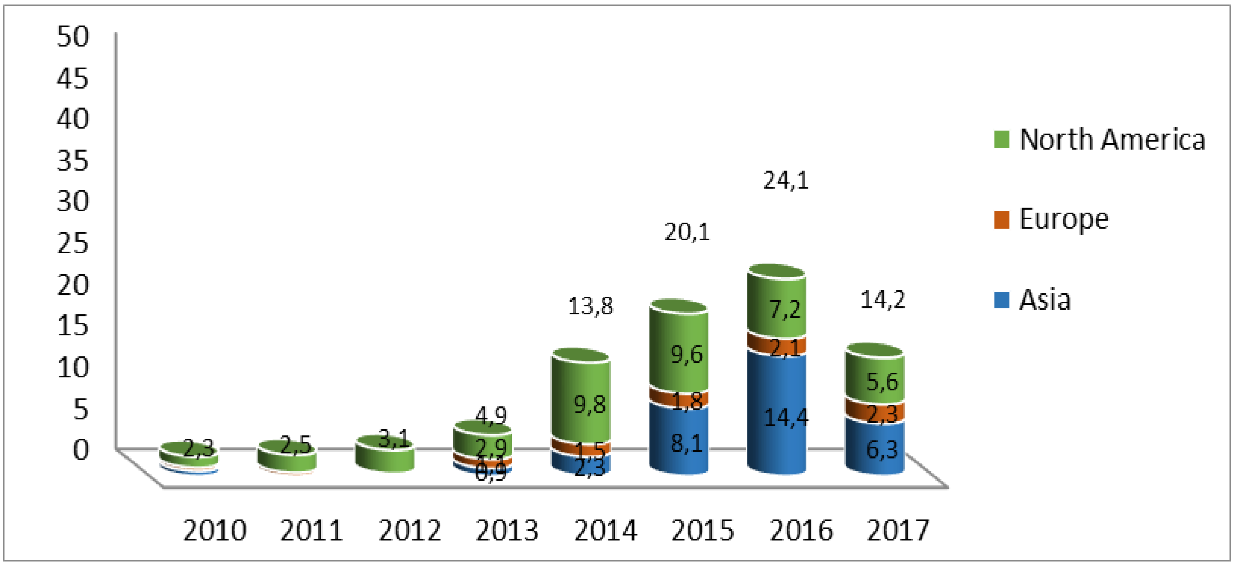
Pillar 5: indeed, financial technology institutions cannot work solely, they need a coherent institutional environment, hence the presence of incubators and social managers, with their ability to access local and international markets with continuous support from government will contribute significantly to the development of the financial industry and increase its impact on sustainable economic development either now and in the future.

More recently: Fintech industry acquired more than $ 24 billion in other investments in the world. Investments have doubled from 2010 to 2016, nearly tenfold, from $ 2.3 billion to $ 24.2 billion, with North America controlling the largest share of investments. From 2010 to 2015 this investment has amounted to $ 2.9 billion in 2013 compared to 1.1 for Europe. and 0.9 for Asia in 2014. The share of North America was 9.8 billion US dollars, compared to 1.5 billion US dollars and 2.3 billion US dollars for Europe and Asia respectively.

Investments in fintech saw a decline in North America starting in 2016. Fintech investments in Asia have risen to 14.4 billion exceeding for the first time the investments in North America for $ 7.2 billion, This decline is Back to the fact that the Asian region has become a destination for investors in this industry. In addition to the control of Chinese companies on foreign investments, especially in the financing and manufacturing sector in Asia, Europe and North America, as shown in Figure1.

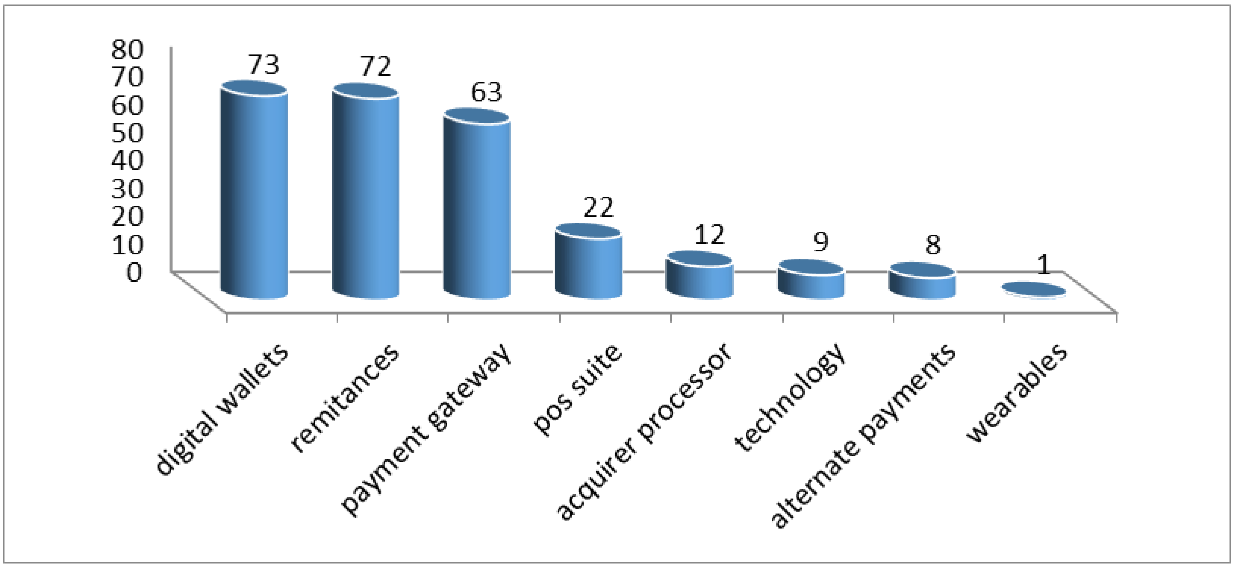
Figure 2 indicates that investments linked to the best business models are unevenly distributed, as digital wallets managed to take a lead of $73 million from investor funds, followed by remittances of $72 million, while the payment gateway was the third option for investments of $63 million. These models, especially the first groups are considering as the foundation to enable financial inclusion to the masses.

Figure (1): Global Investment Activities in Financial Technology (Billions Dollars



Source: (UOB and al., 2018, p. 1)

Figure (2): Investment Focus Areas



Source: (UOB and al., 2018, p. 12)

II. Singapore's Financial Sector: The Intersection of Finance and Technology.

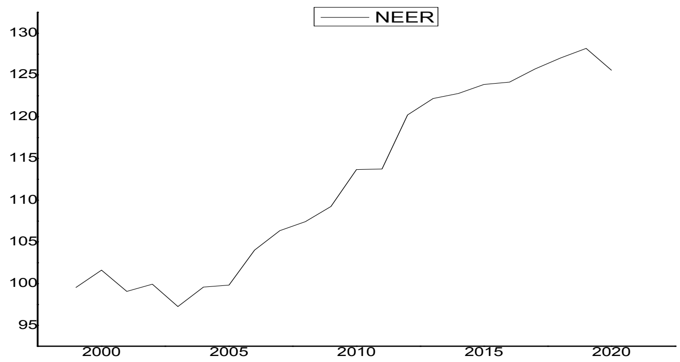
1. Origination and development of the financial sector in Singapore

The financial sector plays an important role in the operations of finance, investment and development; However, there can be no stability without an efficient and developed financial system, and the financial system is defined as the regulatory framework that facilitates financial intermediation in accordance with legal controls and frameworks while remaining permanently under the supervision of the Monetary Authority, in order to improve financial services. Singapore's economy is largely dependent on the expansion of the financial industry in order to become the world's largest smart offshore financial center and achieve sustainable economic growth. The stages of growth of the financial sector in Singapore are as follows:

1.1. Monetary Policy

In the context of monetary policy, the Singapore government decided to lay the foundations for its financial system, as it passed the 1970 Act, which authorized the establishment of the Monetary Authority of Singapore (MAS). The objective of this authority through the policy of inflation targeting is to keep inflation low and stable, while maintaining price stability as a necessary condition for achieving sustainable economic growth. Using exchange rate policy, after the MAS imposed restrictions on the local currency (SGD: Singapore dollar). In 1978, these restrictions were removed in accordance with their economic orientation in favor of risk hedging and de-internationalization (SGD) with freedom transfer of funds to and from Singapore (T, s.d., p. 93). At the beginning of the eighties, monetary policy adopted appropriate strategies for Singapore as a small and open country to the outside world, including the use of the exchange rate as an effective tool for controlling inflation in the medium term. The nominal effective exchange rate of the Singapore dollar (S $ NEER) is another name for the commercial exchange rate, the exchange rate of the Singapore dollar is controlled against a basket of currencies, and the composition of this basket is reviewed on a regular basis by MAS to accommodate changes in trading trends in Singapore. (MAS, 2018, p. 2). From Figure (3) we observe fluctuations (S$NEER) from 1999 to 2020.

Figure (3): S$ Nominal Effective Exchange Rate-1999 to2020 (Index 1999=100)



Source: Prepared by Researchers Based On (A Singapore Government, 2021)

The S$NEER is allowed to fluctuate within the scope of the policy, which helps the MAS to deal with short-term changes in the foreign exchange market while also allowing the S$NEER to be managed more flexibly. The S$NEER policy scope criteria are evaluated every six months to ensure that creep (or estimated rate) is consistent with underlying economic conditions (MAS,2018, p.3).

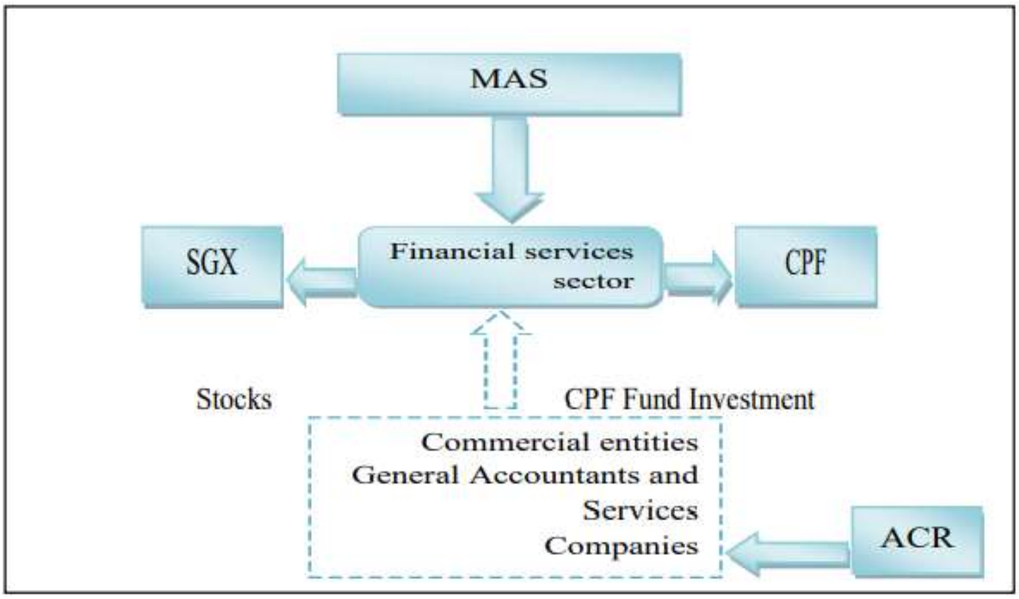
1.2 Reform and restructure of the financial sector

Soon after the establishment of the Monetary Authority (MAS)*, Singapore announced the establishment of the Singapore Stock Exchange (SES) in 1973, which would later merge into the International Singapore Stock Exchange (SGX). All of this was a preparation for building a strong financial system (Jie, 2017, p.3). the financial sector was also supported by the SESDAQ Board of Directors, which played a pivotal role in the 1987 listing of small companies on

* For a review of the MAS' organisation structure, see the appendix (3)

the Singapore International Stock Exchange to accelerate financial services and secure patents. but more than that, Singapore has become more forward-looking, as many countries have adopted the income of pension funds as a source for establishing their economic projects because of the good opportunities available for investment in various fields, and the huge amounts they contain, as mandatory financial institutions. Therefore, Singapore has set up a Central Provident Fund (CPF). This fund controls the reinvestment of funds in the pension system and regulates other business entities through the Accounting and Corporate Regulatory Authority. Figure (4) shows the many bodies and organizations involved in the supervision and management of financial services in Singapore.

Figure (4): Financial Policy Entities



Source: (Jie, 2017, p. 5)

With the aim of linking the financial sector to the labor market, and creating job opportunities in financial technology institutions, the Institute of Banking and Finance (IBF) has been appointed by the National Employment Council in 2020 as a business development partner (IBF & MAS, 2020). Singapore's ability to transform its strategies into tangible results and its openness to the outside world have enabled it to attract foreign capital and exploit these investments in projects directed at the banking sector. As the banking sector currently includes 200 banks of which 125 are commercial banks. only 34 banks have achieved full banking status including 5 domestic banks and 29 foreign banks (Chow-Tan, 2019, p. 3). The three dominant national banks in Singapore are; the Development Bank of Limited (DBS) in 1968 and (OCBC) in 1933 and UOB

Bank in 1949, with branches in other countries of the world (Tschoegl, 2001, pp. 41-46-49).

2. Singapore's Government Embracing "FinTech"

The Singapore government built its current and future development strategies to see Singapore as a smart and pioneering financial center, by setting up regional and international partnership agreements covering financial services provided in Singapore, with more than 400 agreements. These agreements have allowed the application of governance rules and precautionary measures to enhance the financial sector, and increasing quality of services provided.

With the growth and expansion of financial services in Singapore, it has become necessary for the government to standardize and coordinate the work of financial institutions and agencies, by:

2.1 Improved Institutional Infrastructure

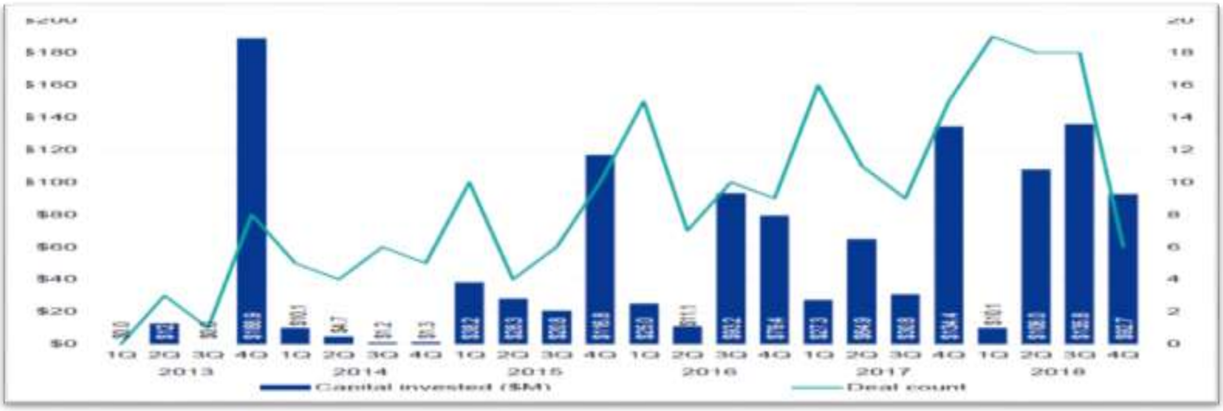
Under the slogan Nothing is Impossible and with a skilled workforce, Singapore launched the "Smart Nation" initiative, bypassing all obstacles in order to build a solid institutional infrastructure, to enhance its financial position regionally and internationally. This prompted Singapore to set up a FinTech office and a Special Administration for FinTech and Innovation (FTIG), in order to sort all out about financial transactions and solve fintech problems to settle interbank transactions. (Mittal, 2019, pp. 2-3) In 2018, the Intellectual Property Office of Singapore (IPoS) launched the Fast Track Initiative (FTFT) to improve and speed up the examination of FinTech patent applications and reduce the time to file a transaction from 42 to 6 months, in an attempt to lay the regulatory and institutional basis for the adoption of technology, (FTFT) covered the areas of electronic payment, investing in payment platforms, insurance technology, blockchain, and banking (intellectual Property Office of Singapore, 2018, p. 2). at the same period in which an open architecture platform API Exchange (APIX) was launched to support innovation and put financial institutions in an API shared environment (Monetary Authority of Singapore, Enterprise Singapore). The map of fintech in 2020 see Appendix (4) gave a clearer picture of the services provided by fintech organizations. Payments and transfers were supported by the PSA application, an application that simplifies the legislative system for payment and transfer services, such as domestic and cross-border money transfer services, and everything related to electronic payment methods and the issuance of electronic money. The financial market platform has identified the issuance of digital bonds on the Singapore Stock Exchange (SGX) as a new challenge in the field of digital assets. Not far from the field of finance, the Monetary Authority of Singapore (MAS) and the Smart Nation and

Digital Government Group (SNDGG), have launched the Singapore Financial Data Exchange (SGFinDex), to support digital infrastructure and enable individuals to access their data and financial resources, through personal finance. Protection is a basic requirement of individuals and a service that financial technology institutions compete with. Therefore, providing savings and protection on mobile phones is part of the efforts of insurance companies. Insurtech – SingLife, a local company merged with Aviva Singapore, is one of the biggest deals the financial sector has seen in Singapore and Southeast Asia in the field of savings, protection, and providing products and advisory services. Appendix (5) shows the uses of FinTech in Singapore, where cryptocurrency took the first place with 19%, then the second place was for payments with 15%, and the third place with 14% for investments (wealthtech), then the rest of the areas of financial technology (Fintech Singapore,2021,p.17).

2.2 Public sector encouragement and support for innovation initiatives

To deal with the funding issue, the government created an additional public funding grant of $127 million in 2017, which is based on prioritization in coordination between universities, training centers, the state budget, and human resources to focus on financial education. From Figure (5), we can conclude that global FinTech investments in Singapore, which multiplied 9-fold between 2013 and 2018 due to government incentives, regulatory measures, business infrastructure, and government-provided technology to serve the financial services sector and Singapore's economy. In order to counter the risks and contain the damages, MAS, SFA and AMTD have formed a solidarity fund of $6 million to assist FinTech companies in Singapore to overcome the difficult economic climate caused by the COVID-19 outbreak. The funding will help FinTechs better manage their financial flows, develop new businesses, and provide more assistance to growth projects (SFA, 2021, p. 11).

Figure (5): Total Investment Activity in FinTech in Singapore from 2013 2018



Source: (Pulse of Fintech 2018, 2019, p. 69)

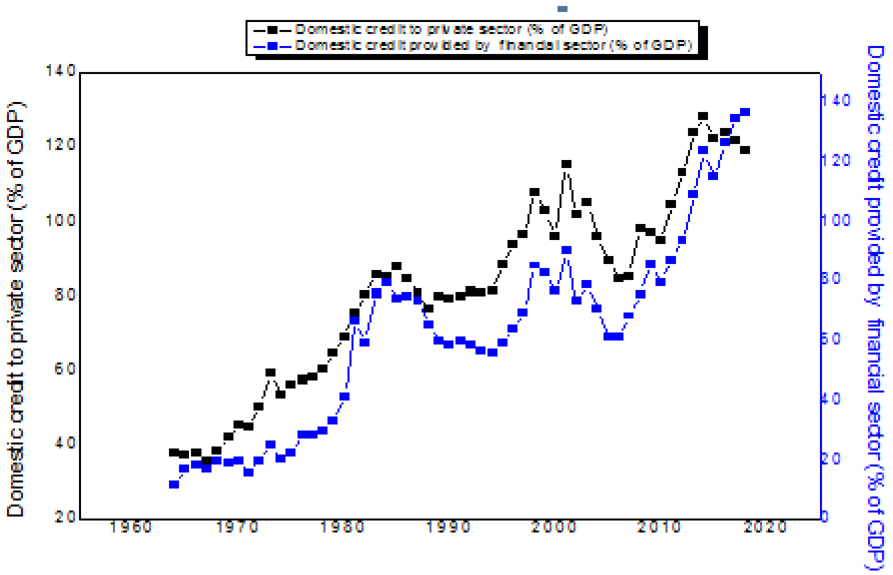
III. Financial Sector from the Lens of Macroeconomic in Singapore

1. Indicators of financial sector development and the path of economic development in Singapore

The developed financial sector provides a favourable environment for investment and reduces poverty rates, which contributes to high growth rates. World Bank estimates that the development of the financial sector can be calculated through: (1) Domestic credit provided by the financial sector, expressed as a percentage of GDP, which measures the depth and development of the banking sector. (2) Domestic private sector credit as a percentage of GDP, measures the private sector's access to credit.

From Figure(6), we note the increase in credit granted to the private sector as a percentage of GDP during the period 1964 to 2018 from 37.92% to 118.94%, and these rates fluctuated during periods of crisis (1987, 1997, 2008, 2014). Domestic credit provided by the financial sector as a percentage of GDP increased from 11.54% to 136.6% during the same period, with fluctuations in times of crisis.

Figure (6): Domestic credit to private sector and Domestic credit provided by financial sector (% of GDP) in Singapore from 1961-2019

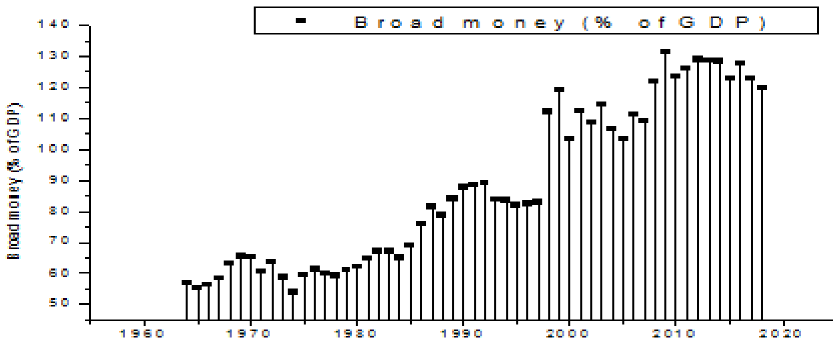


Source: Prepared by Researchers Based On: (World Development Indicators, s.d.)

Development of financial sector could be measured through money supply, However, the effectiveness of monetary policy in controlling this supply to affect GDP growth, unemployment, inflation, and exchange rate depends on the number of goods and services produced, its ability to attract foreign capital, and the economic situation of the country.

Money supply in its broad sense as a percentage of GDP in Singapore reached its highest level in 2009 at 45.131% and 119.72% in 2018 compared to 26.55% in 1965 See Figure (7). This unprecedented growth in money supply goes back to the increase in the number of goods and services produced in Singapore. Besides diversifying sources of financing and providing new financial assets. It is noted that controlling money supply as a tool for achieving balance was not always the preferred choice in Singapore, given that monetary policy depends on managing exchange rate as a mediator for price stability.

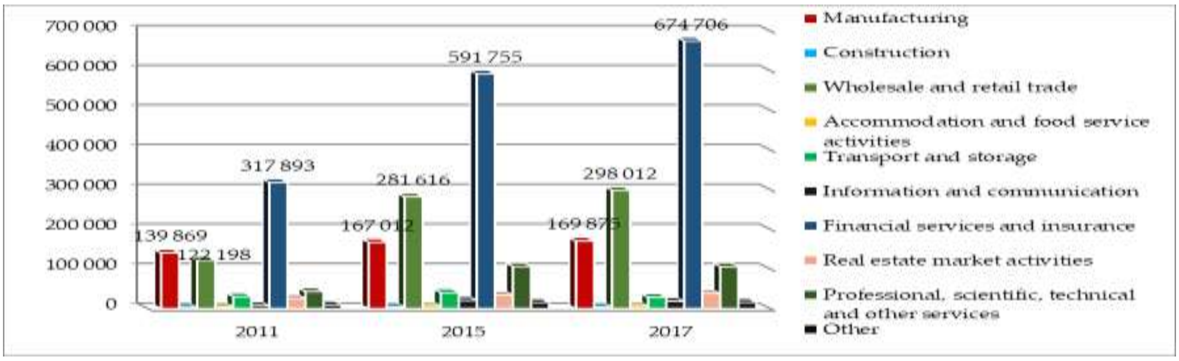
Figure (7): Broad Money (% of GDP) in Singapore from 1965 - 2018



Source: Prepared by Researchers Based On world bank datab (World Development Indicators, s.d.)

The percentages of major economic sectors in the Singaporean economy show that the contribution of financial service sector as a share of GDP was accounted for 89%, while the industrial sector was estimated at around 21%. Accordingly, one can conclude that the structural transformation and development plans based on future visions have played a pivotal role in promoting development and diversifying the Singaporean economy. Figure (8) represents investments according to economic sectors, as the financial services sector attracted foreign investments estimated at $ 674.706 million, followed by the wholesale trade and trade sector with $ 298.012 million, the industry sector with $ 169.875 million. and then the rest of other sectors.

Figure (8): Foreign direct investment in Singapore by industry (million dollars)



Source: Prepared by Researchers Based On (Departement of Statistics Singapore, 2018, p.11)

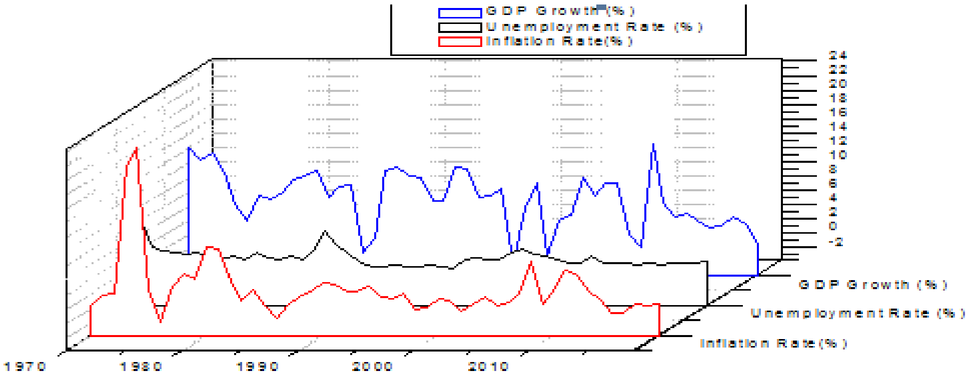
Singapore's fintech sector attracted over $ 222 million in total fintech financing in 2018, outperforming ASEAN countries by 48.5% (Lin, 2019, p. 94). In the same year, the iFAST platform evolved into a comprehensive asset management platform worth $ 8007 billion in Singapore, which enabled Singapore to enter other markets such as Hong Kong and Malaysia. All these strategies and incentives will pave the way for wealth management platforms to become more reliable in the foreseeable future, as they are now in a context of growth driven by industry offerings and processes, and work to improve digital relationships in all industries. (Mittal et al., 2018, pp. 9-17). Singapore's developing digital economy may add more than $ 10 billion to Singapore's GDP in 2021, so it is planned to digitize 60% of Singapore's GDP (MITTAL & others, 2018, pp. 9-17).

2. Historical Path of Financial Sector in Containing Economic Crises in Singapore:

The crisis of 1997 has aggravated the Singaporean macroeconomic variables due back to several factors. For instance, the over-openness to the outside world, and its association with Southeast Asian countries, and not to mention of being a center for capital flows from abroad. These factors have caused a recession and unbridled inflationary pressures, as inflation rates
hiked to 2.0% in 1998 compared to 0.2% and 0.2% in 1997 and 0.0 % in 1999 respectively. Also, unemployment rates have risen from 1.4% to 5.2% in 1998. GDP growth decreased from 3.8% in 1997 to 1.2% in 1998 following the exit of hot money in parallel with a shortfall in the size of exports, which affected public spending and recorded a steep rise in indebtedness. Indicators of banking system could not avoid the implications of the crisis, since it was forced to entering into mergers and acquisitions.

As a result of economic restructuring, the Singaporean economy steped in an economic recession, which caused a decrease in GDP from 0, 9% in 2000 to -1.0% in 2001. In 2003 and 2004 GDP has increment again to 4.5% and 9.8% consecutively as a result of economic recovery, at a time when signs of recovery began to appear in the first quarter of 2007. The 2008 crisis has affected the growth of the Singaporean economy as the GDP rates declined from 9% in 2007 to 0.1% in 2009. Likewise, for rates of unemployment rates, where this latter has fallen from 2.1% in 2007 to 3% in 2009, and inflationary recession rates reached 2.1% in 2007 and 0.5% in 2009. To contain the adverse effects of this crisis, the Singaporean government developed strategies to reform financial sector under its prudential supervision by addressing a legislative aspect of the financial sector. Besides pushing market participants to respond to these reforms and involving private sector in improving Market performance to achieving high growth rates.

Figure (9): Macroeconomic Fundamentals of Singapore



Source: Prepared by Researchers Based On (Labour Force Survey; Manpower Research & Statistics Department; MOM 2020 ; World Development Indicators., 2020)

In the offset of 2020, the lockdown worldwide due to Coronavirus has abolished numerous investment projects and caused an economic slack, which precipitated intervention of the Singaporean government through its economic policies to enhance financial stability and contain the repercussions of Covid-19 by reducing interest rates to be in line with interest rates globally and reducing nominal exchange rates to bail out the economy. what can be noticed in this period, that revenues of service industries have shart-fall in uneven proportions according to its sensitivity to the decrease in demand on the one hand and the implications of quarantine and travel restrictions on another hand (For more explanations, see Table1).

There is no doubt that the unavoidable effects of the epidemic have posed a huge pressure on financial sector in Singapore, thus tightening financial conditions was a coercive option to spare the economy from collapse. in this period, GDP rate declined from 0.7% in 2019 to -5.8% in 2020, while unemployment in the same period has incremented to 3% compared to 2.3% in 2019 (see Appendix 1). Singapore recorded a decrease in its exports and imports of goods and services in 2019 and 2020 see Appendix (2) due back to lower global demand, and a decline in foreign direct investment.

Table (1): Change in Business amount of index by sector

Industry	Year-on-Year 2020	Quarter-on-Quarter 2020
Transportation& Storage	-22.4%	+5.5%
Information & Communications	+12.1%	+15.3%
Finance & Insurance	+2.1%	+6.2%
Real Estate	-18.2%	+8.9%

Professional Services	-8.5%	+15.4%
Administrative & Support Services	-22.5%	+2.2%
Education	-0.8%	+3.9%
Health & Social Services	-0.8%	+2.1%
Recreation & Personal Services	-37.6%	+10.6%

Source: Prepared by researchers based on (Singapore Department of Statistics, 2021, p. 2)

To ensure that the banking sector has access to financing in Singapore dollars (SGD) and US dollars (USD), government has posed new dedicated facilities, encompassed opening a channel to lend money in Singapore dollars and extending repayment period, while banks maintain their own liquidity reserves.

In April and May 2020, the Singapore Monetary Authority and the Fintech Association has launched the MAS-SFA-AMTD two grants with a value of S $ 131 million, to support Fintech companies affected by Covid-19 to restore its activities.

IV. Conclusion

Singapore is known as the land of miracles due to its development in a short period, and the adoption of financial technology is not difficult for a country that has a strong infrastructure of information and communication technology, which helped to digitize financial services and spread widely in Singapore. Singapore has worked as much as possible to benefit from the technology provided by foreign investment and harness it in various areas of life to increase the demand for smart urban services, which is positively reflected in the increase in Singapore's exports, especially electronic ones. As well as the application of technology to financial services to ensure speed and confidentiality of transactions, and access to a wide segment of society. Fintech also offers many advantages and possibilities, as we saw in the Covid-19 crisis for example, which has greatly facilitated the application of precautionary rules and social distancing due to the availability of a regulatory environment and ICT infrastructure.

By addressing this topic, the following results were obtained:

- Singapore is distinguished by the strength and development of its financial system, and the high level of comprehensive coverage of financial services;
- Singapore's ongoing efforts to enhance and harness its information technology infrastructure, through partnership, cooperation, and adherence to international conventions;
- Fintech has enabled Singapore to reduce transaction costs and reduce time and distances;

- The strength of the financial sector in general and financial technology in particular made Singapore a destination for investment by financial technology companies and strengthened its financial position in the world;
- Singapore's heavy dependence on the exchange rate policy to achieve monetary stability and economic growth, which puts it in constant challenge, especially with the existence of transactions and digital currencies that require security and confidentiality.

V. Bibliographie List

- Singapore Department of Statistics. (n.d.).
- A Singapore Government. (2021, Mar 10). *A Singapore Government Agency Website* . Retrieved from https://www.mas.gov.sg/statistics/exchange-rates.
- Chow-Tan, H. K. (2019). Financial sector in Singapore. School of Economics, Singapore Management UniversitySai Fan PEI,Published in Routledge Handbook on Banking and Finance, Singapore.
- Departement of Statistics Singapore. (2018). *Singapore of Figures 2018.* Singapore.
- Fintech Singapore. (2021). *SINGAPORE FINTECH REPORT 2021.*
- IBF, & MAS. (2020). *National Jobs Council appoints IBF as Jobs Development Partner for Financial Services Sector.* The Institute Of Banking and Finance Singapore(IBF) and Monetary Authority Of Singapore(MAS), Singapore.
- ICAEW, & ISCA. (2018). *Fintech innovation: perspectives from Singapore and London.* institute of Singapore Chartered Accountants, IT FACULTY, Singapore.
- intellectual Property Office of Singapore. (2018). *Launch of FinTech Fast Track Initiative: An Accelerated File-to-Grant Service for Financial Technology Patent Applications (Circular No. 3/2018).* Singapore,.
- Jie, W. J. (2017). *Singapore's Transformation into a Global Financial Hub.* Singapore, Lee Kuan Yew School of Public Policy: National University of Singapore.
- Labour Force Survey; Manpower Research & Statistics Department; MOM 2020 ; World Development Indicators. (2020).
- Legal Group Global. (2019). The International Comparative Legal Guide to Fintech 2019 ,A practical cross-border insight into fintech.
- Lin, L. (2019). Regulating FinTech: The Case of Singapore. *Electronic Journal* , 94.
- MAS. (2018). A brief history of MAS, its roles and functions as well as its organisation structure. *Economics Explorer Series*, 2.
- MAS. (2021). *http://www.mas.gov.sg/About-MAS/Overview/Groupsand-Departments.aspx*. Retrieved 10 25, 2021, from A Singapore Government Agency website.
- McCabe, B. (2020). *A FinTech Strategy for Ireland.* Ireland.
- Ministry of Trade and Industry . (2020). Singapore.
- MITTAL, S., & others, a. (2018). *Singapore's Digital.* DBS Asian InsightsDBS Group Research.
- Mittal, V. (2019). Singapore FinTech Landscape. 2,3.
- Pulse of Fintech 2018. (2019). *Global Analysis of Investment in Fintech, KPMG International.*

- Ridzuan, A., Ismail, N. A., & Che Hamat, A. F. (2017). Does Foreign Direct Investment Successfully Lead to Sustainable Development in Singapore? *Economies* , *5*(29), 1-20. doi:10.3390/economies5030029
- Saksonov, S., & Merlino, I. K. (2017). Fintech as Financial Innovation –The Possibilities and Problems of Implementation. *uropean Research Studies Journal*, 962.
- SFA. (2021). *SINGAPORE FINTECH LANDSCAPE 2020 AND BEYOND.* Oliver Wyman.
- SFA, & EY. (2018). *FinTech ecosystem playbook - https://fintech.neu.edu.vn/Resources/Docs/SubDomain/fintech/EY-fintech-ecosystem-playbook2045865662.pdf.* Singapore.
- Shakib, H. (2013). Transferring the Technology via Foreign Direct Investment: Does this Approach Escalate the Competitiveness of the Economy for the Developing Country? Dans *Proceedings Book of ICEFMO* (p. 668). Malaysia.
- Singapore Department of Statistics. (2021).
- Tee, O. C. (n.d.). Singapore's policy of non-internationalisation of the Singapore dollar and the Asian dollar market. *BIS Papers No 15*, (p. 93).
- Tschoegl, A. E. (2001). The International Expansion of Singapore's Largest Banks. 41,46,49. The Wharton School University of Pennsylvania Philadelphia, Pennsylvania.
- UOB, SFA, & EY. (2018). *State of FinTech in ASEAN 2-ASEAN State of FinTech .https://www.uobgroup.com/tech ecosystem/pdf/UOB-State-of-FinTech-in-ASEAN.pdf.*
- varga, D. (2018). evolution FINTECH, THE NEW ERA OF FINANCIAL SERVICES. *BUDAPEST MANAGEMENT, University Corvinus,Budapest,Hungarian*.
- World Development Indicators. (n.d.).

VI. Appendix

Appendix (1): change in macroeconomic indicators compared to the same period of the previous year

	4Q 2019	2019	1Q 2020	2Q 2020	3Q 2020	4Q 2020	2020
GDP(%)	1,0	0,7	-0,2	-13,4	-5,6	-3,8	-5,8
Unemployment(%)	2,3	2,3	2,4	2,8	3,6	3,2	3,0
Inflation Rate (%)	0,6	0,6	0,4	-0,7	-0,3	-0,1	-0,2

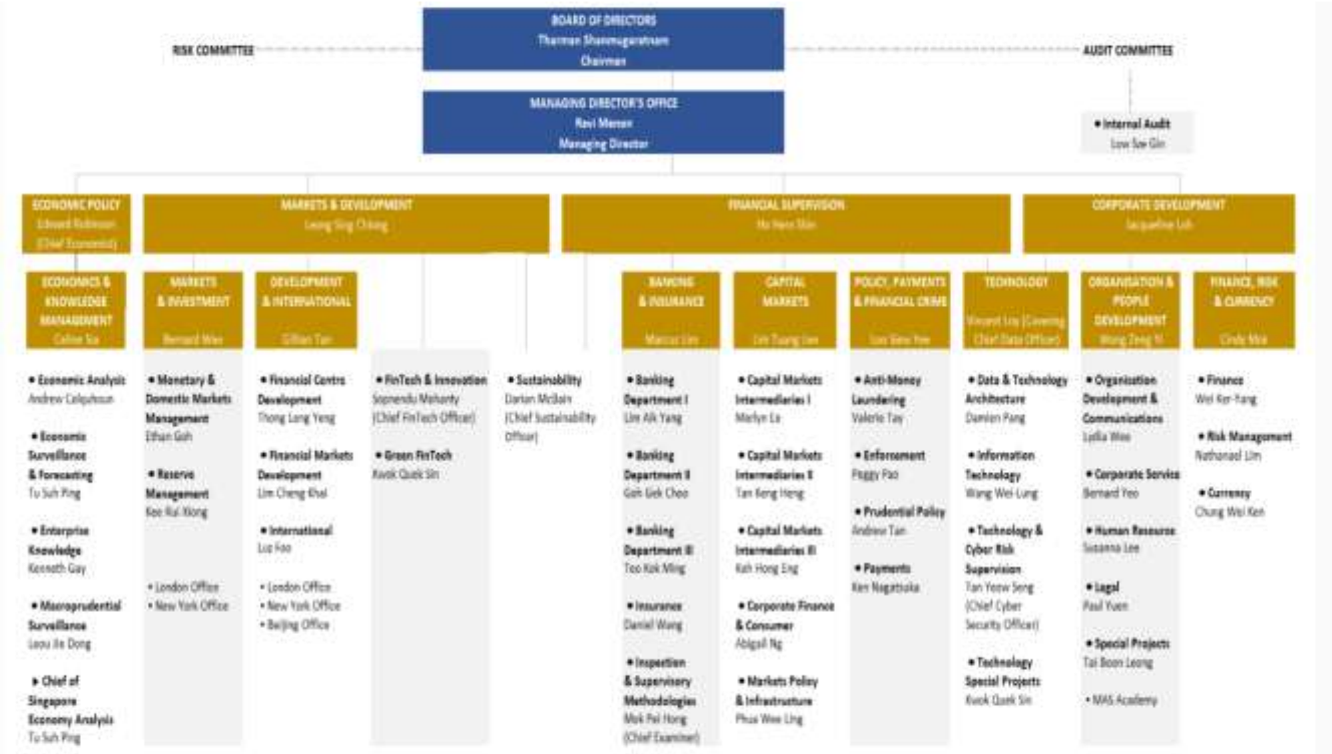
Source: (Ministry of Trade and Industry , 2020, p. 1.8)

Appendix (2): Growth Rates of Total Trade, Exports and Imports (In Nominal Terms)

Year	4Q 2019	2019	1Q 2020	2Q 2020	3Q 2020	4Q 2020	2020
Total Merchandise Trade (yoy, %)	-5,3	-3,2	3,4	-13,9	-4,8	-5,1	-5,2
Merchandise Exports	-4,3	-4,2	4,0	-11,4	-2,2	-2,9	-3,2
Merchandise Imports	-6,3	-2,1	2,6	-16,6	-7,6	-7,6	-7,4
Total Services Trade (yoy, %)	6,6	5,7	-3,0	-21,4	-16,3	-16,3	-14,3
Exports of Services	9,0	6,2	-3,3	-19,1	-14,1	-13,8	-12,7
Imports of Services	4,2	5,2	-2,7	-23,7	-18,7	-18,9	-16,1

Source: (Ministry of Trade and Industry , 2020, p. 8)

Appendix (3): Singapore's Monetary Authority Organization Chart

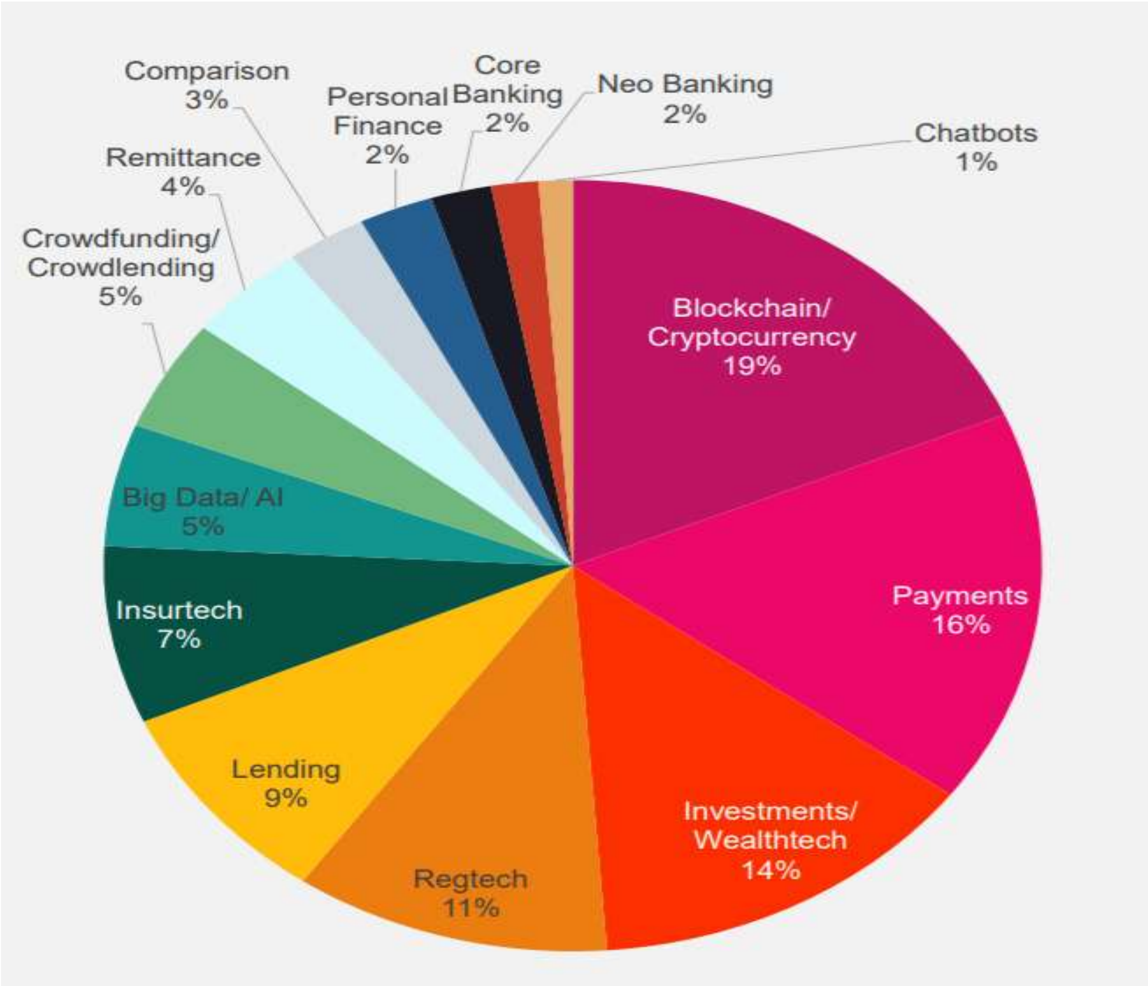


Source: (MAS,2021)

Appendix (4): Map of FinTech in Singapore in 2020 (Non-exhaustive)

Source: (SFA, 2021, p.4)

Appendix (5): Blockchain/ Cryptocurrency leads in Singapore's fintech scene



Source: (Fintech Singapore**,** 2021, p.10)