Economic Resilience During the COVID-19 Pandemic

The Role and Significance of FinTech

STATISTICS-BASED INSIGHTS REPORT
October 2022

Foreword

At the Centre for Sustainable Finance Innovation (CSFI), we aim to produce top-notch and impactful research to tackle world-scale challenges, advance finance theories, and enhance management practice by taking a principled, evidence-based, and interdisciplinary approach. Our work focuses on topics such as climate change, emerging technologies, economic resilience and financial inclusion with the goal of providing thought leadership and impact to the industry and society.

As we are living in a time of uncertainty – the global pandemic, the disruptions of supply chain, rising inflation, geopolitical risk, and climate risk, all occurring alongside the accelerated trend of digitization, every nation and business leader aspires to build a resilient economy and business model to survive in shocks and difficult situations.

Three years into the worst pandemic, different countries and regions show varying capacities to recover from COVID-19's negative shock and different trends of demand for FinTech services. We are pleased to present this report designed and implemented between March 2022 to September 2022 to advance our understanding of the significance and impact of FinTech on economic resilience during the pandemic.

Simba Chang & Cindy Deng
Co-Directors, Centre for Sustainable
Finance Innovation

Research Team

Cai Cen

Cen is a PhD candidate in Finance at Shanghai University of Finance and Economics. Her research interests center on behavioral finance and FinTech.

He Yu

Yu is a Assistant Professor at China University of Geosciences (Beijing). She specializes in corporate finance, especially corporate environmental responsibilities and corporate innovation.

Peng Jiaxin

Jiaxin is a PhD candidate in Finance at Shanghai University of Finance and Economics. She specializes in corporate finance, especially FinTech and information disclosure.

Peng Zhuozhen

Zhuozhen is a PhD candidate in Finance at Nanyang Technological University. Her research interest lies in empirical corporate finance, behavioral finance, and emerging finance topics (e.g., sustainable finance and Fintech).

Contents

Executive Summary

FinTech, the delivery of financial services via digital mediums, has since the 2010's been an area that has attracted the attention of consumers, businesses, investors, and regulators alike. The benefits have been repeated ad nauseum – equitable access to capital and services for underserved market segments, ease of use and convenience, added security measures to protect people from fraudulent activity – the list goes on. Simply put, FinTech has the potential to make using finance easier, quicker, and cheaper. It is no wonder that it has remained a hot button topic for the better half of the last decade. It seemed to be on a never-ending upward trend, continuing even today with analysts projecting the FinTech sector to grow at a CAGR of 26.2% through to 2030.

In that time, however, the world also contended with the most far reaching and severe pandemic it had witnessed in recent memory. COVID-19, which spread to become a global pandemic in early 2020, held the world at gun point. Border restrictions, quarantine measures, nationwide lockdowns – policies implemented to curb the spread of the virus – invariably brought booming post-GFC economy to a screeching halt. Businesses shuttered, stock prices plummeted, people were retrenched in the thousands – overnight, the world was at a standstill. The unequivocal pessimism was pervasive. But just as quickly as the world retreated, bright spots slowly started to emerge and the long road to recovery had begun. By 2021, several countries had rebounded admirably to almost pre-pandemic levels even as the pandemic raged on; of course, in no small part thanks to the sweeping vaccination policies most countries implemented. Though vaccines were available on a global scale, one could quickly notice that not all countries recovered at an equal pace or extent. Why was this so?

Therein lies the heart of our report, which examines the different factors that could either have a positive or negative impact on economic recovery. Did FinTech, for all its accolades, play an important role in a country's economic recovery? To that end, we studied the impact FinTech had on determining the resilience of a country's economy, using GDP growth and unemployment rate as proxies for economic resilience. The following was observed:

Countries with more developed FinTech industries had more resilient GDP growth

Countries with stronger FinTech development prior to the pandemic experience higher GDP growth in the face of COVID-19. Other factors considered, namely, better education, economic development, lower average population age, and less reliance on the tourism industry, also positively impacted changes in GDP growth.

Executive Summary

Countries with more developed FinTech industries had more resilient employment levels

Countries with strong FinTech development prior to the pandemic are associated with strong employment recovery notwithstanding the pandemic, albeit to a lesser extent compared to its impact on changes in GDP growth. Instead, the maturity of a country's digital infrastructure, prior GDP per capita, stringency of social distancing policies, and population size are the five factors which influence changes in employment rates in a positive manner more so than FinTech.

Mobile payments, a segment of the FinTech industry, had a strong positive impact on economic resilience

Mobile payments have a positive impact on both GDP growth rates and employment rates. Notwithstanding lockdown protocols, people could continue to access daily necessities through online channels. COVID-19 fundamentally reshaped consumption habits and accelerated the development of the contactless economy – an unsurprising development as contactless payment methods are meaningful tools in helping reduce the spread of the virus – which is enabled primarily by mobile payments. Other components of FinTech were also conducive to economic resilience. Digital investments have a positive impact on GDP growth rates, while digital banking has a positive impact on changes in unemployment rates.

There has been an aggregate uptick in demand for FinTech services since the pandemic, based on Google search volume data

Two observations are apparent. First, there was an overall spike in search volume for FinTech-related terms following the outbreak of COVID-19, and these levels had remained since. The main driver for this persistent high-level of interest has been demand for mobile payments. Second, developing countries and those with underdeveloped FinTech industries exhibited a higher increase in demand for FinTech services compared to countries with more developed FinTech industries, save for mobile payments, which exhibited similar rising demand in both matured and developing FinTech ecosystems.

FinTech demand in SEA is representative of the global trends

In SEA, it was observed that there was a 50% increase in demand for FinTech services from 2019 to 2020, coinciding with the outbreak of the pandemic. Moreover, the interest in mobile payments increased to 80% in the same period – indicating that the trend in SEA is in line with the global trend that mobile payments is driving overall demand for FinTech services.

INTRODUCTION

In December 2019, the world was introduced to a novel coronavirus – SARS-CoV-2 – a pathogen that causes COVID-19. Arguably the most severe pandemic in recent history given the extremely interconnected world we live in, the world quickly found itself scrambling to contain the spread of the virus by imposing strict controls of movement and extensive social distancing protocols. While different nations approached the pandemic with varying degrees of decisiveness and constraints on personal freedoms, each invariably leaned towards some semblance of limiting social interactions and racing to vaccinate populations to bring the virus under control. As much as we tried, however, many had fallen to the virus' grip.

In just under three years since the first reported case of COVID-19, the World Health Organization reported more than 615 million cases and 6.5 million deaths globally, notwithstanding the administration of more than 12 billion doses of the vaccine, as of early October 2022. Experts, however, have commented the total case and death count is likely to have exceeded these official reported numbers because of the lack of reliable health statistics in many developing nations.

While the toll on human life remains the fundamental priority, a study on the economic cost is a timely and worthwhile endeavour as it continually impacts the lives of the billion others who have been fortunate enough to survive the pandemic.

It would not be an exaggeration to say that the impact of the pandemic on the global economy has been nothing short of a catastrophe – it plunged the global economy to its deepest recession since the Great Depression, pushing millions into poverty as businesses closed and jobs were lost.
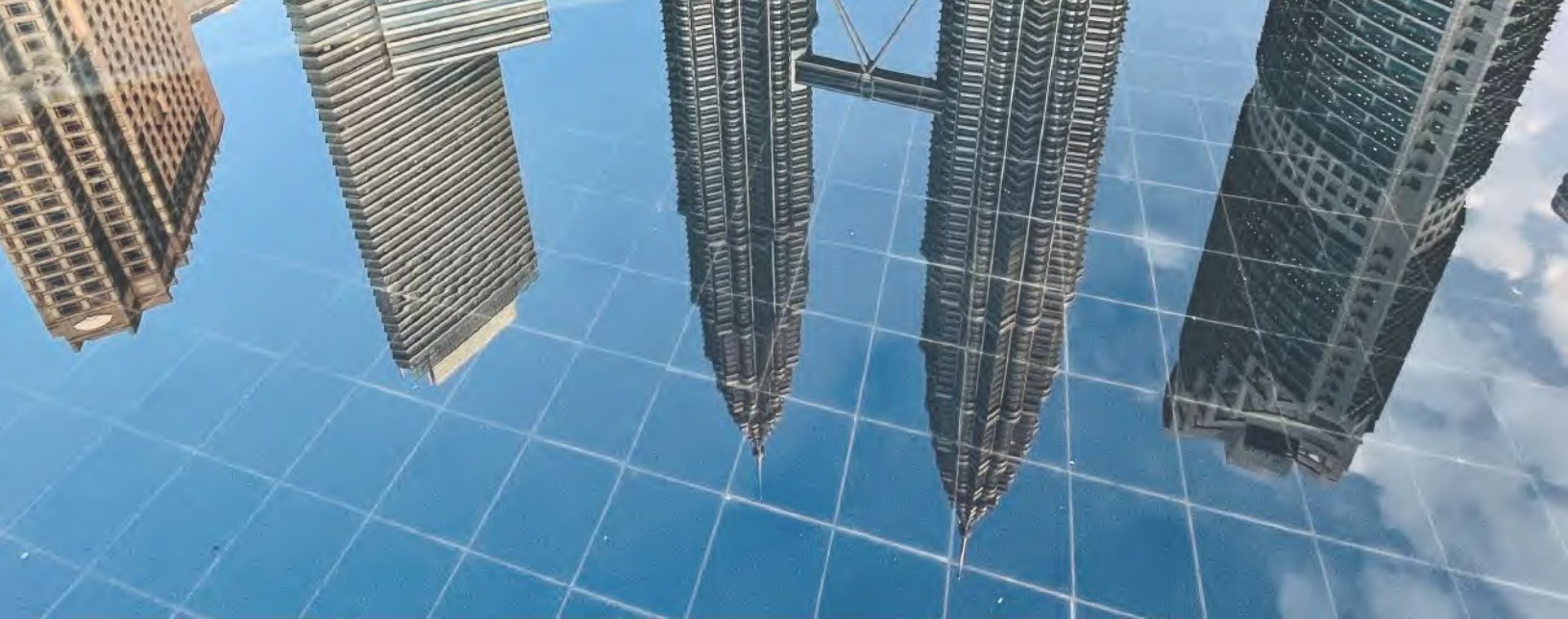
400 million

Full-time jobs lost between April to June 2020

10% decline

Overall worldwide worker income between January to September 2020

US $3.5 trillion

Loss due to decline in worker income

Source: International Labor Organization Monitor: COVID-19 and the world of work

While past studies have analyzed this unprecedented economic downturn and relative recovery amid COVID-19, **the ambition of this report** is to build on the work of these past studies towards the following ends:

How fast does an economy recover from the pandemic shock?

This report develops an economic resilience measure to capture both the speed and strength of economic resistance and recovery in response to the pandemic shock.

To what extent did developed FinTech industries help economies recover?

Examine the role and significance of FinTech in building economic resilience.

Was there an uptick for demand for FinTech services during the pandemic?

Analyze the change in demand for FinTech services during the pandemic by relying on the 62 most frequently searched terms that related to FinTech.

What are the other factors that drive a country's economic recovery?

An expansive report, it considers 16 country-level determinants across technological, economic, political, social, and healthcare factors in 86 countries.

WHAT IS ECONOMIC RESILIENCE

Economic Resilience measures a country's capacity for its economy to recover

In the context of COVID-19, "Resilience" could either refer to a country's capacity to resist the spread of the virus save human lives, or for a country's capacity for its economy to recover. This report focuses on the latter.

More precisely, we analyzed economic resilience vis-à-vis two proxies for economic development: (i) change in GDP growth and (ii) change in unemployment rate.
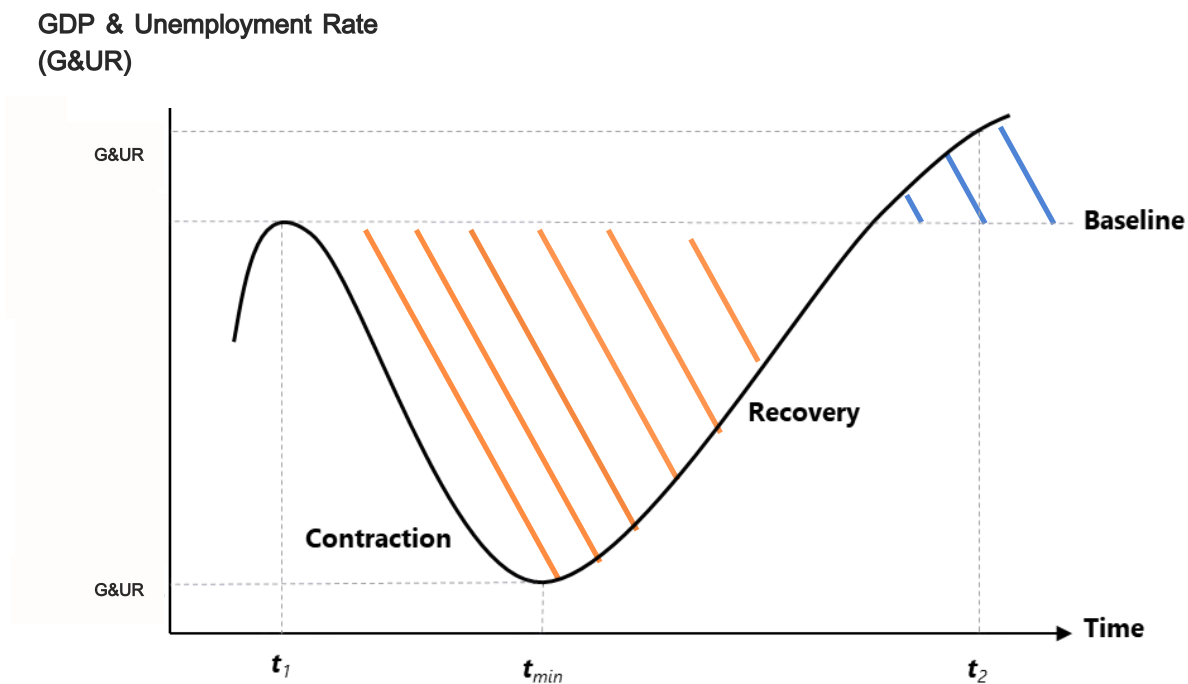

Figure: Conceptual Economic Resilience Model

The curve simulates changes of either GDP growth or Unemployment Rate change over time. This curve can apply to each country.

Contraction period is defined as the period at the time point of the beginning of the pandemic shock ($t1$) to the time when it reaches its trough of economic development ($tmin$).
Recovery period is defined as the first rebound period following $tmin$ to 6-months after ($t2$).

If GDP growth (unemployment rate) at t2 is above (below) that at t1 when the pandemic shock happened, it indicates that the country's economy has recovered to above pre-pandemic levels. Conversely, it indicates that the country's economy was recovering more slowly and yet to bounce back to pre-pandemic shock levels.

The resilience value is the sum of the negative orange area and the positive blue area in the figure.

How Long Does it Take to Hit Rock Bottom?

Based on the 86 countries and regions surveyed, most reached the trough of their change in GDP growth relatively faster than that of their unemployment rate potentially due to stimulus policies such as subsidies and tax reductions to prevent loss of jobs.

Average time taken for a country to reach the lowest point of their economic development level after the first reported case…

3 months

For a country to reach the lowest GDP growth rate

7 to 8 months

For a country to reach the lowest employment rate

The study conducted to support this report was geographically diverse…

Samples	Regions
41	Europe & Central Asia
15	Latin America and the Carbbean region
13	East Asia and the Pacific region
9	Middle East and North Africa
4	Sub-saharan Africa
2	North America
2	South Asia

… and considered countries across the spectrum of economic maturity

Pie chart: 18%, 31%, 51%
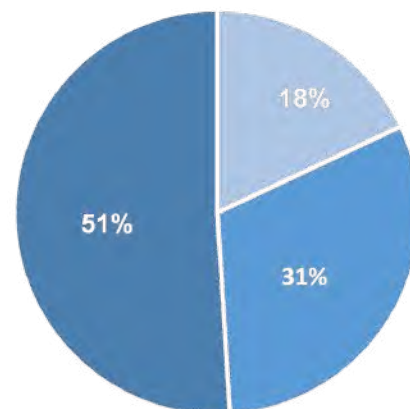
- High-income group(>$12,696 GNI per capital)
- Upper-Middle-income group($4,096 to $12,695 GNI per capital)
- Low-Middle-income group(<$4,095 GNI per capital)

Hitting rock bottom, however, is only one part of the equation... Countries which ranked higher on the economic resilience ranking also exhibited faster recovery to pre-pandemic levels

The following countries exhibited relatively stronger GDP growth resilience based on the economic resilience measure: **Vietnam**, **Ireland**, **Turkey**, **Kenya** and **China**.

However, unemployment rate resilience based on the economic resilience measure, exhibits different patterns from GDP growth resilience. With regards to unemployment rate resilience, **Mongolia**, **Italy**, **Greece**, **France** and **Kenya** perform relatively better. The data suggest that Mongolia fared best. This could perhaps be explained by the fact that it is a heavily nomadic society.

FINTECH AND ECONOMIC RESILIENCE

FinTech facilitates access to financial services via digital mediums. The maturity of the FinTech industry in a country is one of the two technological factors we consider, alongside the other 15 factors across economic, political, social, and healthcare categories, when measuring economic resilience. It generally refers to four essential FinTech segments covering P2P and Online Lending, Mobile Payments, Digital Banking, and Digital Investments.

In which way and to what extent did a more developed FinTech ecosystem influence economic resilience?

Mobile Payments

Transaction value in digital payments market over its GDP. Also referred to as FinTech Payments.

Digital Investments

Automated investment services, known as robo-advisors, and online trading services, known as neobrokers. Also referred to as FinTech Investment.

P2P and Online Lending

Digital lending over its GDP, where the digital lending market segment includes alternative lending for MSMEs and freelancers, online market places for personal loan applications and private investors, and peer-to-peer loans with interest rates depending on internal credit scoring of the platform provider. Also referred to as FinTech Lending.
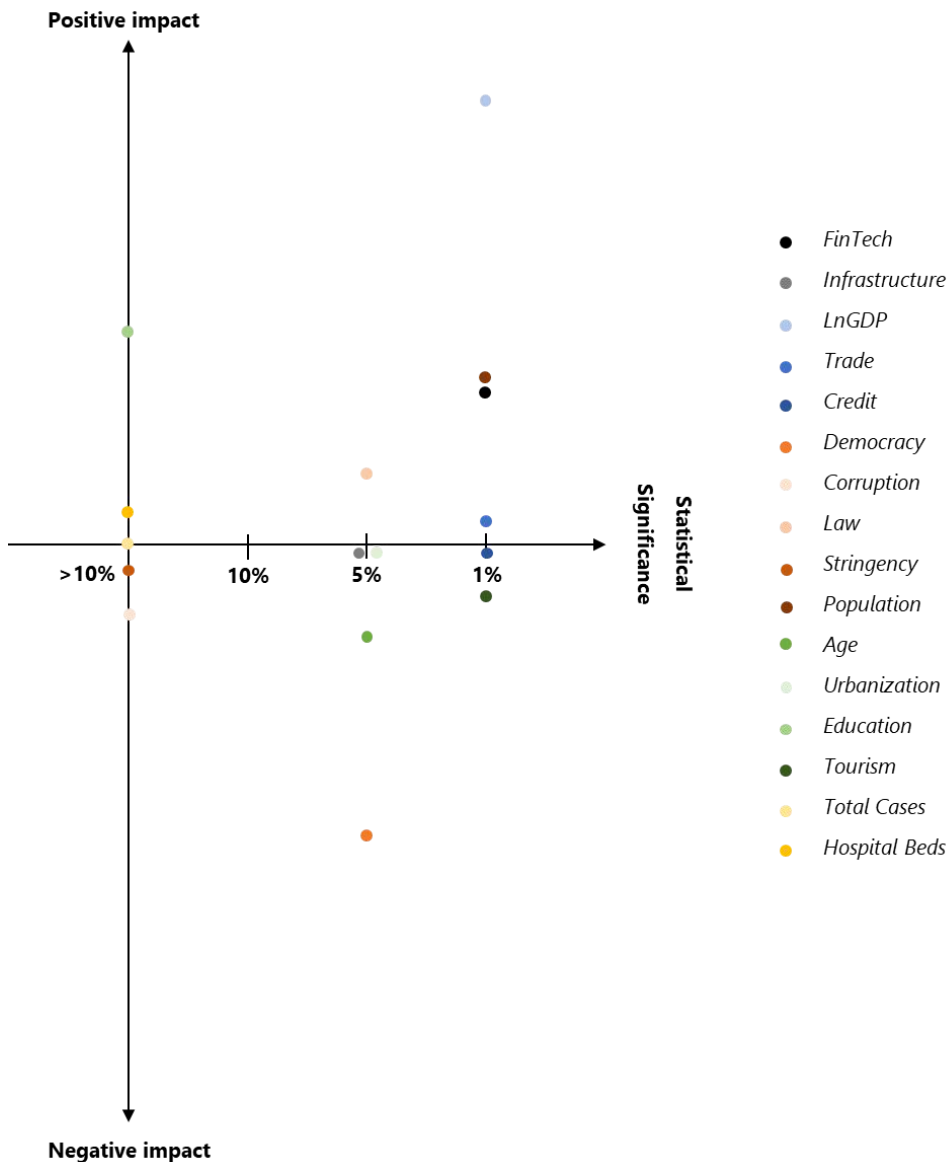
Digital Banking

Digital financing over its GDP, where the digital financing market includes alternative financing from MSMEs and freelancers, equity-based crowdfunding, reward-based crowdfunding. Also referred to as FinTech Financing.

Figure: FinTech Industry Segments Defined

Impact and Significance of Factors in relation to change in GDP Growth

Positive impact

Statistical Significance

>10%   10%   5%   1%

FinTech
Infrastructure
LnGDP
Trade
Credit
Democracy
Corruption
Law
Stringency
Population
Age
Urbanization
Education
Tourism
Total Cases
Hospital Beds

Negative impact

The above is a generalization for FinTech services on an aggregate. A more nuanced analysis on each individual FinTech industry segment reveals more particularly that:

Mobile Payments and Digital Investments positively impact changes on GDP growth

Positive / negative impact refers to whether the factor increases or decreases change in GDP growth in a positive manner. A score of zero would indicate the factor has no impact, while a higher positive value will indicate an increasingly positive impact, vice versa.

Statistical significance refers to the probability for which the result was derived by chance; the lower to percentage, the less likely for rejection and greater likelihood the conclusion is correct.
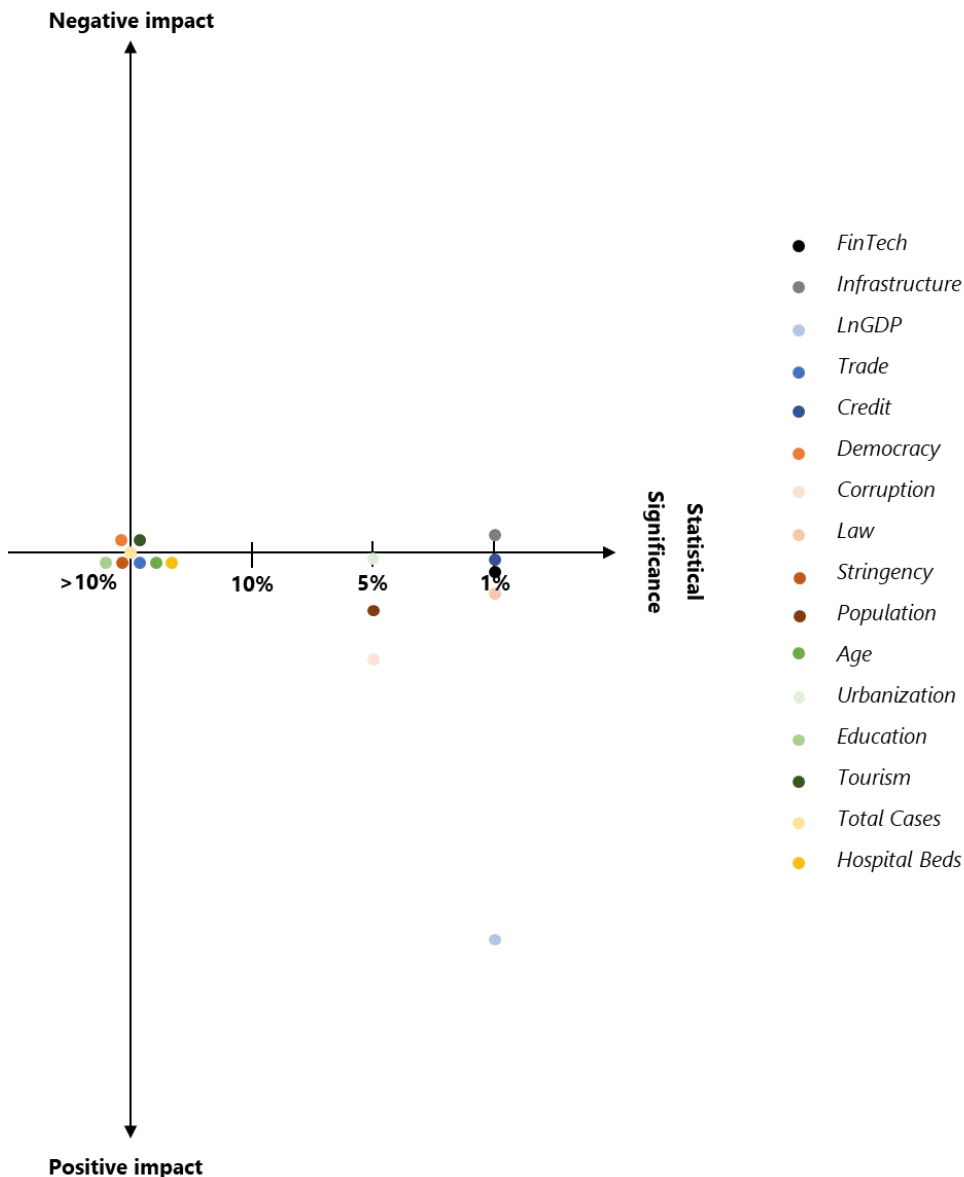
Mature FinTech Ecosystems and Established Digital Infrastructure have a Compounding Positive Impact on GDP growth resilience

Strongly related to the maturity of FinTech ecosystems is the other technological factor considered – Infrastructure, which refers to the level of development of technological infrastructure related to digital networks, social networks, and technological innovations. This factor considers the availability of latest technology, internet access, use of virtual social networks, and investment in emerging technology as indicators of maturity.

We observed that developed FinTech ecosystems and countries with established digital infrastructure kept economies running, to the extent they have a compounding and complementary positive effect on GDP growth. Notwithstanding lockdown protocols, people could continue to access daily necessities through online channels. COVID-19 fundamentally reshaped consumption habits and accelerated the development of the contactless economy which relies on digital infrastructure as the core tenet.

Impact and Significance of Factors in relation to change in Unemployment Rate

Negative impact

Positive impact

Statistical Significance

>10%   10%   5%   1%

- FinTech
- Infrastructure
- LnGDP
- Trade
- Credit
- Democracy
- Corruption
- Law
- Stringency
- Population
- Age
- Urbanization
- Education
- Tourism
- Total Cases
- Hospital Beds

Similarly, albeit to a lesser extent, the data suggests that more developed FinTech ecosystems positively influence the change in unemployment rates – framed in another manner, the more developed the FinTech ecosystem of the country, the lower the unemployment rate.

Mobile Payments and Digital Banking positively impact changes on unemployment rates.

Positive / negative impact refers to whether the factor increases or decreases change in GDP growth in a positive manner. A score of zero would indicate the factor has no impact, while a higher positive value will indicate an increasingly positive impact, vice versa.

Statistical significance refers to the probability for which the result was derived by chance; the lower to percentage, the less likely for rejection and greater likelihood the conclusion is correct.

Example of mature FinTech ecosystems in Asia that exhibited strong GDP growth resilience

China

Digital payments ensured people in quarantine had less disrupted access to goods and services. Long before COVID-19 struck, China already had the world's largest and most developed FinTech ecosystem – the transactions volume of China's non-bank online payment platforms had reached approximately US$35 trillion in 2019.

Testament to the pervasiveness of FinTech in the country, local governments in China have distributed free digital vouchers through online payment platforms such as Alipay and Wechat Pay to deliver stimulus funds.

Vietnam

Due to its limited medical resources, large population and densely populated cities, Vietnam implemented a series of strict border restriction and lockdown measures early at the onset of the pandemic.

Within SEA, Vietnam's 100 million population places it a close 3rd in size and is also the 2nd fastest growing FinTech market in the region with a projected market size of US$18 billion by 2024, having exhibiting strong FinTech adoption in the years prior to the pandemic.

Singapore

A much smaller market compared to China and Vietnam, Singapore nonetheless achieved strong GDP growth resilience rankings given its position as one of SEA's most developed FinTech ecosystem – even as the pandemic resulted in a fall in overall FinTech funding globally, the funding landscape in Singapore has been less volatile. Despite the initial dip in funding, the investments in FinTech quickly rebounded by the second quarter of 2020. This is testament to the unrivalled confidence investors and entrepreneurs have in Singapore as the regional FinTech hub. This confidence is largely due to active regulatory support, tax treatise, political stability, adherence to free market economics, and availability of talent.

Countries which fared well in economic resilience adopted different approaches to pandemic prevention. Some imposed strict measures, while others took a light-touch pandemic strategy. For instance, Sweden, considered technologically advanced, adopted a light-touch pandemic strategy but has fared well since. Denmark, too, slowly started re-opening its society and industry by April 2020, mere weeks after it declared a national lockdown and border closures. Despite the difference, we observed that the key ingredient to developing resilience economic shocks was to be technologically advance.

Other factors' impact on GDP growth

Economic factors were key to building GDP growth resilience. Countries with better economic fundamentals or more open economies are associated with higher economic growth during the pandemic. The domestic credit provided by the banking sector, the last economic factor considered, however, has a marginally negative impact, suggesting more domestic lending is counter productive to GDP growth.

The positive impact of having a larger population and the negative impact of an older age structure imply that countries with larger populations and a younger age structure will recover faster. This is a reasonable conjecture as larger local populations will support local demand despite global supply chain disruptions to a certain extent, and aging populations are generally associated with higher tax burdens on people of working age.

Education has a substantial positive impact. This is not a surprise, given that higher education levels, which imply better education overall, have traditionally been shown to promote the rehabilitation of economies.

More urbanized countries are associated with slower GDP recovery. This is consistent with the fact that cities are densely populated and therefore, often hotspots for spreading the virus.

With the international travel restrictions, countries that relied more heavily on the tourism industry will invariably see their GDP recover at a slower pace.
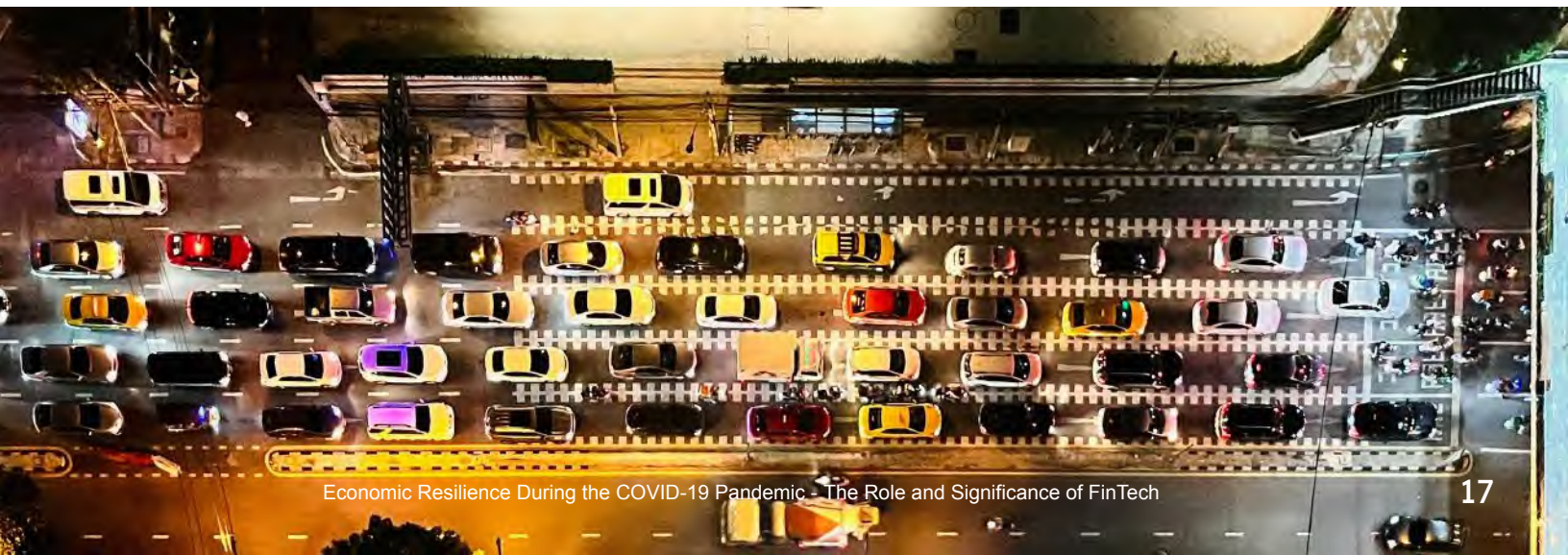
Technologically advanced countries have strong
unemployment rates resilience

Higher educational attainment was an even more influential factor in maintaining strong resilience against increasing unemployment in most countries. Populations with higher education was a key factor influencing people's willingness to get vaccinated, with those with high education levels more likely to be vaccinated. Unsurprisingly, the combination of high education and high vaccination rates, resulted in a faster return to unemployment rates at pre-pandemic levels upon the relaxation of lockdown measures.

Countries with **greater levels of economic development** and **financial activity**, as measured by the availability of credit from the banking sector, promote unemployment rate resilience, implying that economic and financial strength during the pandemic enables countries to avoid severe unemployment.

Countries with **stricter laws** have stronger labour market resilience to shocks, as they potentially facilitate a more disciplined business operating environment and quicker integration in the local economy.

A SURGING DEMAND FOR FINTECH

Search Volume on a Global Level

The surging demand for FinTech is an unsurprising development given the use of contactless payment methods are meaningful tools in helping reducing the spread of the virus. That said, how can we quantify or ascertain this growth? We approach the issue by studying the global trends of Google search volumes of FinTech-related terms.

P2P and Online Lending

crowdfunding   peer to peer lending
p2p   p2p lending
online loans   crowdlending
loan apps

Mobile Payments

digital money   samsung pay   qr code
google pay   android pay   qr codes
mobile wallet   digital wallet cash app
apple pay   wallet app
                  amazon payment
                  contactless payment
                  near field communication

Google Search Word List Categorized

Digital Banking

open bank account online
online bank
online banking
digital banking
mobile banking
open banking

Digital Investments

online trading   fintech
robo advisors   fintech companies
regtech   insurtech
                   financial technology
                   online investment
   trading account

Search Volume on a Global Level

Since 2016, there has been a general increase in search volume for all four FinTech segments on a global aggregate level. The first spike was seen in mid-2018, before dipping back to a steady state in early 2019. The second spike was right at the beginning of the pandemic in early 2020. Unlike in 2018 and 2019 when the search volume receded, the high volume of search remained following the 2020 spike.
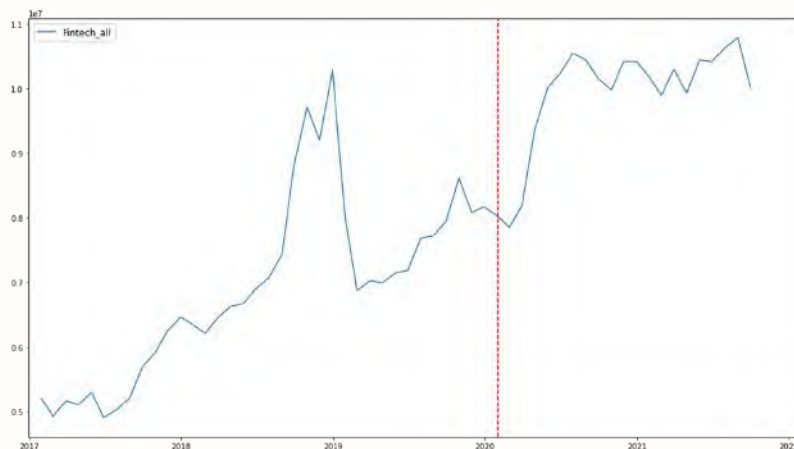
A further question becomes apparent: **is there an equal interest in FinTech across all four segments?** To that, the data suggests that mobile payments is the major category driving demand for FinTech services. Unlike digital banking, digital investments, and P2P and online lending categories which saw a spike at the onset of COVID-19 before receding, interest in mobile payments remained at the level of the spike, following a similar trend to FinTech services generally. This suggests then, that mobile payments is driving the overall increased interest in FinTech services.
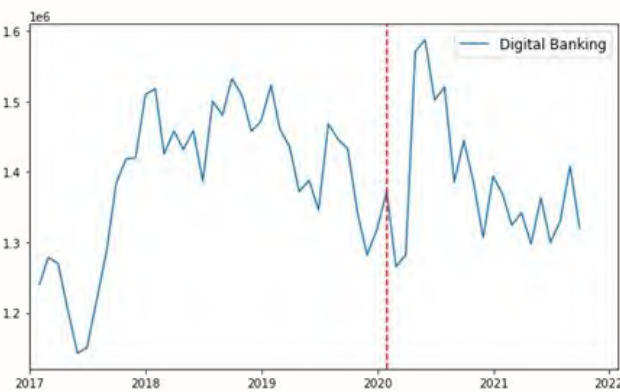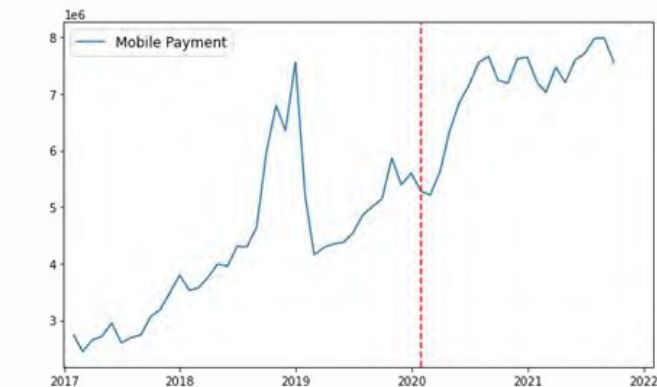
On a more granular level, we noticed that while there was a general global increase in interest as evidenced by the Google search volumes, not all countries exhibited a similar trend.

Some countries and regions exhibited a similar spikes in Google search volume for Fintech-related terms to that of the global trend...

- United States
- South Korea
- Singapore
- Malaysia
- Vietnam

... and some others exhibited similar trends but with a lagged reaction

- Australia
- Canada
- the Philippines

... but some others did not exhibit any obvious surge in the Google search volume at all...

- United Kingdom
- Hong Kong SAR, China
- Indonesia
- Thailand
- Japan

The data further suggests that developing countries and those with underdeveloped FinTech industries exhibit a higher increase in demand for FinTech services after the outbreak of COVID-19. This observation was apparent from the Google search volumes for terms relating to digital investments, digital banking, and P2P and online lending. However, countries with both developed and undeveloped FinTech industries exhibited similar rising demand for mobile payments, perhaps further explaining why mobile payments is the main driver of the persistent high level of interest in FinTech measured by Google search volume since 2020.

In Southeast Asia in particular, we observed that there was a 50% increase in demand for FinTech services from 2019 to 2020, coinciding with the outbreak of the pandemic. What is more telling still, is that interest in mobile payments increased 80% in that same period. This, therefor indicates that the trend in Southeast Asia is in line with the global trend that mobile payments is driving overall demand for FinTech services.

Search Volume on Mobile Payment
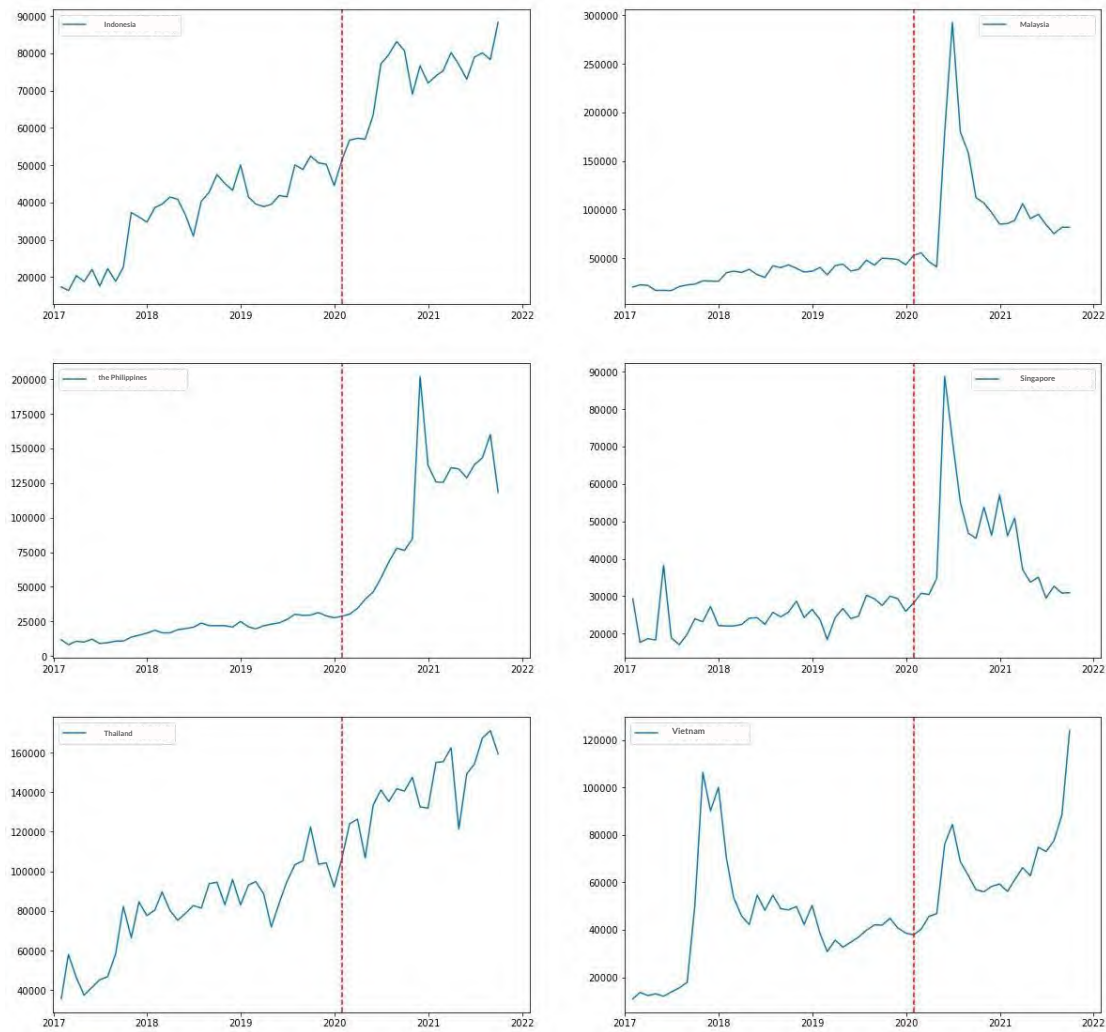
Indonesia and Thailand exhibited a steady increase in demand for mobile payments since 2017, accelerating during the pandemic. Interest has since remained high with no indication of slowing in both countries.

Singapore, Malaysia, the Philippines lagged in comparison, with each country exhibiting a flat level of interest in mobile payments from 2017, and only exhibiting a significant spike in interest during the pandemic. While demand has since waned from their peaks, they remain higher than before the pandemic.

Vietnam exhibited a unique trend, with its first peak in interest for mobile payments sometime in 2018. Interest then dropped as quick as it rose, plateauing between 2018 to 2020, before it once again saw increasing demand during the pandemic. Interest has since remained high.

Search Volume on Fintech & Digital Investment
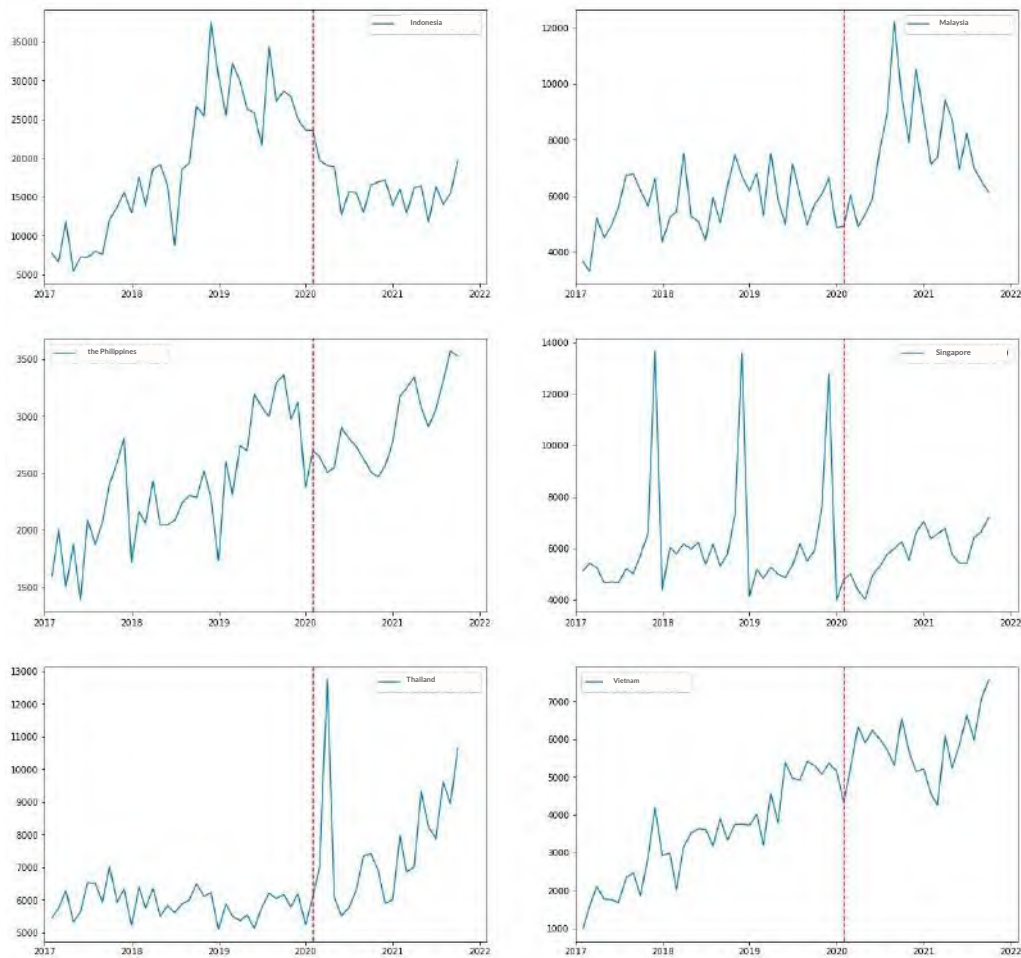
The Philippines and **Vietnam** exhibited a general increase in demand for digital investment services since 2017.

The **other SEA countries**, however, exhibited unique trends. Interest for digital investment services in **Indonesia** peaked in 2019 and was on a downward trend during the pandemic. It has since steadied at a relatively consistent level which is higher than that of 2017. In **Malaysia**, there was a steady demand for such services prior to the pandemic but showing a significant spike during in late 2020. Demand has since dropped but remains at a higher level than before the pandemic.

Similar to Malaysia, **Thailand** also exhibited a steady demand for digital investment services prior to the pandemic before seeing a huge spike in demand during the pandemic. However, the trend in Thailand is different from that of Malaysia in that while interest dropped quickly after its peak, demand has bounced back upwards quickly. **Singapore** exhibited an interesting trend, seeing peaks in each of 2018, 2019, and 2020. A cyclical pattern, the interest for digital investment services probably coincided with the market performance. Since the pandemic, however, we have not seen a similar peak, but instead, a steady increase in demand over time.

Search Volume on Digital Banking
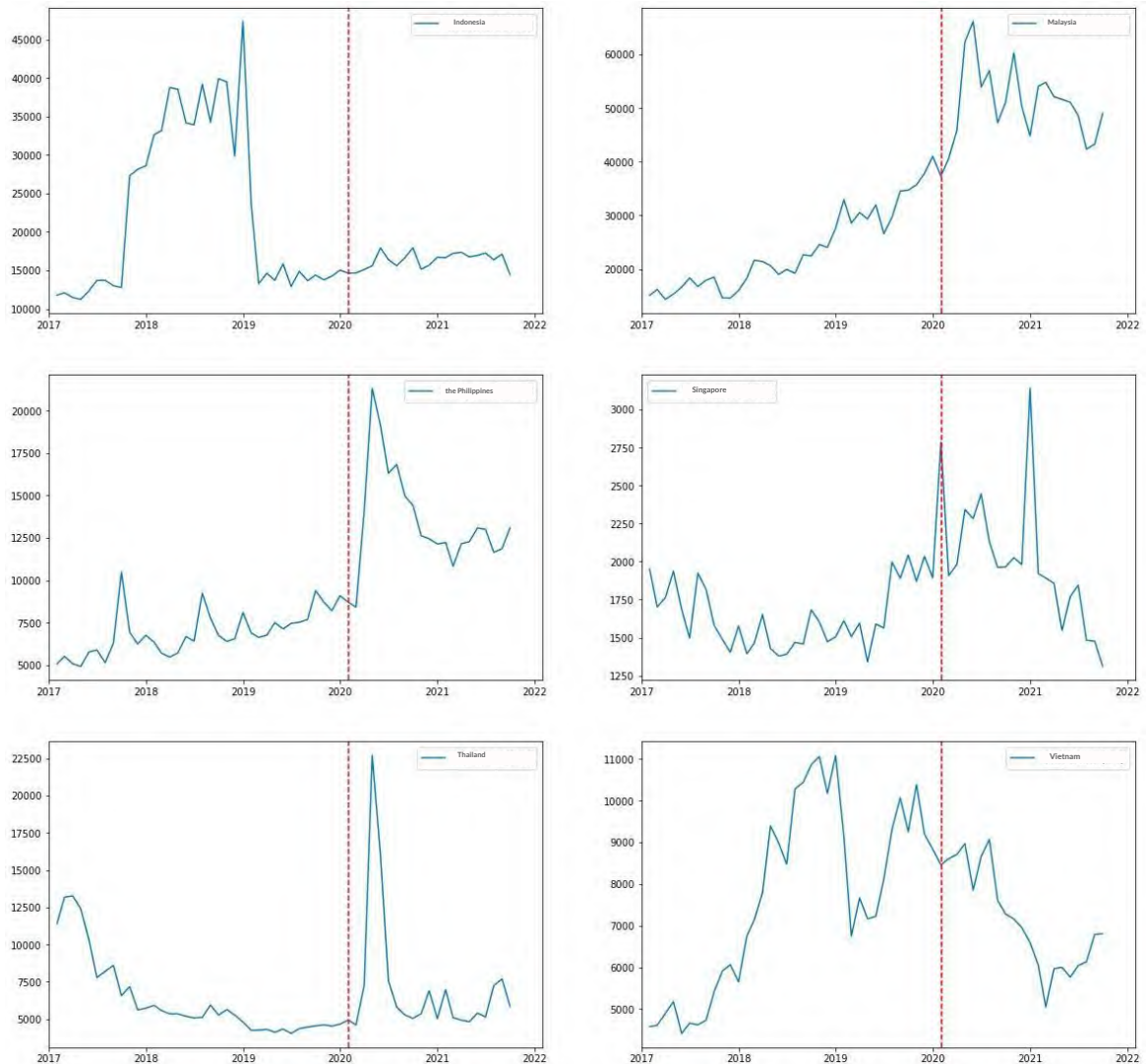
Malaysia and the Philippines exhibited a general increase in demand for digital banking services since 2017, seeing their peak in demand at the onset of the pandemic. While demand has since dropped slightly from these peaks, they remain at a level higher than before the pandemic.

Indonesia trended differently, with demand for digital banking services peaking in 2019, before dropping significantly since to a steady level of interest. The pandemic had no discernable influence in demand. Interest in Vietnam, too, did not appear to be affected by the pandemic.

Thailand and Singapore exhibited spikes in interest at the onset of the pandemic before quickly tapering off. Singapore, however exhibited a second peak in 2021.

Search Volume on P2P & Online Lending

Indonesia exhibited a general increase in demand for P2P and online lending services since 2017. The Philippines exhibited a similar trend pre-pandemic, but diverged post-pandemic, dropping quickly at the onset of COVID-19. However, interest has increased over time.

Malaysia and Singapore exhibited almost identical trends, with interest in such services peaking in late 2018 and early 2019. Demand in both countries, however, has decreased since,

with the pandemic having no discernable impact on demand either upwards or downwards. Demand in Thailand, too, did not appear to be influenced by the pandemic – instead, interest peaked later in mid 2021.

In Vietnam, interest in these services was high in 2018. While demand tapered off in 2019, it was on an uptrend when the pandemic struck, and has generally remained strong.

CONCLUSION

Three years into the COVID-19 pandemic, society has returned to a semblance of normalcy. The virus is relatively under control with the widespread use of vaccines, and the loss of human life has tapered off tremendously since the peaks of the pandemic. Human liberties once restricted in the name of social responsibility and virus containment have by and large since been restored almost to pre-pandemic times – but how have economies fared?

In answering this question, we proposed an economic resilience measure to understand the extent to which economic, technological, political, social, and healthcare factors played a role in influencing changes in GDP growth and unemployment rates in either a positive or negative manner. Particularly, FinTech had a significant positive influence on both GDP growth and unemployment rate resilience.

On closer inspection, we observed that mobile payments, one of the four FinTech industry segments, was the main driver of the FinTech industry's significance. It was unsurprising then, that there was an overall increase in demand for FinTech services because of the pandemic – a trend that will potentially continue the rise for years to come.

References

Ahmed, Nova, Rahat Jahangir Rony, Syeda Shabnam Khan, MD. Sabbir Ahmed, Anik Sinha, Anik Saha, Shajnush Amir, Ifti Azad Abeer, and Sayan Sarcar, 2021, Resilience during covid pandemic: Role of fintech in the perspective of bangladesh, Working Paper, *Available at SSRN 4009497*.

Amankwah-Amoah, Joseph, Zaheer Khan, Geoffrey Wood, and Gary Knight, 2021, Covid-19 and digitalization: The great acceleration, *Journal of Business Research* 136, 602-611.

Arner, Douglas W., Janos Nathan Barberis, Julia Walker, Ross P. Buckley, Andrew M. Dahdal, and Dirk Andreas Zetzsche, 2020, Digital finance & the covid-19 crisis, Working Paper, University of Hong Kong Faculty of Law Research Paper No. 2020/017.

Balyuk, Tetyana, Nagpurnanand R. Prabhala, and Manju Puri, 2020, Indirect costs of government aid and intermediary supply effects: Lessons from the paycheck protection program, NBER Working Paper No.28114.

Bannigidadmath, D., P. K. Narayan, D. H. B. Phan, and Q. Gong, 2022, How stock markets reacted to covid-19? Evidence from 25 countries, *Finance Research Letters* 45, 102161.

Bao, Zhengyang, and Difang Huang, 2021, Shadow banking in a crisis: Evidence from fintech during covid-19, *Journal of Financial and Quantitative Analysis* 56, 2320-2355.

Beck, Thorsten, and Jan Keil, 2022, Have banks caught corona? Effects of covid on lending in the U.S, *Journal of Corporate Finance* 72, 102160.

Ben-David, Itzhak, Mark J. Johnson, and René M. Stulz, 2021, Why did small business fintech lending dry up during march 2020?, NBER Working Paper No. 29205.

Berg, Tobias, Andreas Fuster, and Manju Puri, 2021, Fintech lending, NBER Working Paper No. 29421.

CCAF, World Bank, and World Economic Forum, 2020, The global covid-19 fintech market rapid assessment report.

Cumming, Douglas J., Andrea Martinez-Salgueiro, Robert S. Reardon, and Ahmed Sewaid, 2021, Covid-19 bust, policy response, and rebound: Equity crowdfunding and p2p versus banks, *The Journal of Technology Transfer*.

Eichenbaum, Martin S, Sergio Rebelo, and Mathias Trabandt, 2021, The macroeconomics of epidemics, *The Review of Financial Studies* 34, 5149-5187.

Erel, Isil, and Jack Liebersohn, 2020, Does fintech substitute for banks? Evidence from the paycheck protection program, NBER Working Paper No. 27659.

Fairlie, Robert, 2020, The impact of covid-19 on small business owners: Evidence from the first three months after widespread social-distancing restrictions, *Journal of Economics & Management Strategy* 29, 727-740.

Fei, Celine Yue, and Keer Yang, 2021, Fintech and racial barriers in small business lending, Working Paper, *Available at SSRN 3949148*.

Fiss, Peer C., 2011, Building better causal theories: A fuzzy set approach to typologies in organization research, *Academy of Management Journal* 54, 393-420.

Fu, Jonathan, and Mrinal Mishra, 2022, Fintech in the time of covid−19: Technological adoption during crises, *Journal of Financial Intermediation* 50, 100945.

Furman, Jason, Timothy F. Geithner, Robert Glenn Hubbard, and Melissa S. Kearney, 2020, Promoting economic recovery after covid-19.

Granja, João, Christos Makridis, Constantine Yannelis, and Eric Zwick, 2020, Did the paycheck protection program hit the target? NBER Working Paper No. 27095.

Han, Yicheol, and Stephan J. Goetz, 2019, Predicting us county economic resilience from industry input-output accounts, *Applied Economics* 51, 2019-2028.

Howell, Sabrina T., Theresa Kuchler, David Snitkof, Johannes Stroebel, and Jun Wong, 2021, Automation and racial disparities in small business lending: Evidence from the paycheck protection program, NBER Working Paper No. 29364.

Hu, Xiaohui, Liangang Li, and Ke Dong, 2022, What matters for regional economic resilience amid covid-19? Evidence from cities in northeast china, *Cities* 120, 103440.

Kass-Hanna, Josephine, Angela C. Lyons, and Fan Liu, 2022, Building financial resilience through financial and digital literacy in south asia and sub-saharan africa, *Emerging Markets Review* 51, 100846.

Kogan, Leonid, Dimitris Papanikolaou, Amit Seru, and Noah Stoffman, 2017, Technological innovation, resource allocation, and growth*, *The Quarterly Journal of Economics* 132, 665-712.

Kutzbach, Mark J., and Jonathan Pogach, 2022, Bank technology and the covid-19 pandemic, Working Paper, FDIC Center for Financial Research No.2022-02.

Levine, Ross, Chen Lin, and Wensi Xie, 2020, Local financial structure and economic resilience, Working Paper, *Available at SSRN 3755560*.

Li, Lei, and Philip E. Strahan, 2021, Who supplies ppp loans (and does it matter)? Banks, relationships, and the covid crisis, *Journal of Financial and Quantitative Analysis* 56, 2411-2438.

Liu, Yun, Yun Zhang, Yifei Zhang, and He Xiao, 2022, Small business owners' fintech credit in crises: Theory and evidence from farmers under the covid-19, *Pacific-Basin Finance Journal* 71, 101692.

Malkova, Alina, and Alex Weng, 2022, Peer-to-peer lending for small businesses during covid-19, Working Paper, *Available at SSRN 4073081.*

Martin, Ron, and Peter Sunley, 2014, On the notion of regional economic resilience: Conceptualization and explanation, *Journal of Economic Geography* 15, 1-42.

Martin, Ron, Peter Sunley, Ben Gardiner, and Peter Tyler, 2016, How regions react to recessions: Resilience and the role of economic structure, *Regional Studies* 50, 561-585.

Mena, Carlos, Antonios Karatzas, and Carsten Hansen, 2022, International trade resilience and the covid-19 pandemic, *Journal of Business Research* 138, 77-91.

Oprea, Florin, Mihaela Onofrei, Dan Lupu, Georgeta Vintila, and Gigel Paraschiv, 2020, The determinants of economic resilience. The case of eastern european regions, *Sustainability* 12, 4228.

Pappas, Ilias O., and Arch G. Woodside, 2021, Fuzzy-set qualitative comparative analysis (fsqca): Guidelines for research practice in information systems and marketing, *International Journal of Information Management* 58, 102310.

Pierri, Nicola, and Yannick Timmer, 2020, It shields: Technology adoption and economic resilience during the covid-19 pandemic, Working Paper, IMF.

Pinshi, Christian P., 2021, Exploring the usefulness of fintech in the dark era of covid-19, *Journal of Advanced Studies in Finance* 12, 40-50.

Ragin, Charles C., 2009, Configurational comparative methods: Qualitative comparative analysis (qca) and related techniques, (SAGE Publications, Inc., Thousand Oaks, California).

Rezaei Soufi, Hojat, Akbar Esfahanipour, and Mohsen Akbarpour Shirazi, 2022, A quantitative approach for analysis of macroeconomic resilience due to socio-economic shocks, *Socio-Economic Planning Sciences* 79, 101101.

Schmutzler, Jana , Koen Smeets, and Stefan Zeisberger, 2021, How fintech can help latin america to deal with economic challenges and the covid-19 crisis, *Working Paper* Available at SSRN 3673240.

Spiegel, Matthew, and Heather Tookes, 2021, Business restrictions and covid-19 fatalities, *The Review of Financial Studies* 34, 5266-5308.

Sugandi, Eric Alexander, 2021, The covid-19 pandemic and indonesia's fintech markets, Working Paper, ADBI No. 1281.

Teima, Ghada O., Matthew Gamser, Martin Hommes, Jade Christian Hachem, and Andrea Cuadra Miranda, 2021, Msme digital finance : Resilience and innovation during covid-19 (english), (Washington, D.C. : World Bank Group).

Tut, Daniel, 2022, Fintech and the covid-19 pandemic: Evidence from electronic payment systems, Working Paper, Available at SSRN 3660987.

Yan, Chen, Abu Bakkar Siddik, Nazma Akter, and Qianli Dong, 2021, Factors influencing the adoption intention of using mobile financial service during the covid-19 pandemic: The role of fintech, Environmental Science and Pollution Research.