

The impact of Fintech on inflation and unemployment: the case of Asia

The impact of
Fintech

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Youssra Ben Romdhane

*Faculty of Economics and Management of Sfax, University of Sfax, LED,
Sfax, Tunisia*

Souhaila Kammoun

IHEC Sfax, University of Sfax, CODECI, Sfax, Tunisia, and

Sahar Loukil

*Faculty of Economics and Management of Sfax, University of Sfax, ARTIGE,
Sfax, Tunisia*

Received 17 August 2022

Revised 28 October 2022

11 January 2023

Accepted 15 January 2023

Abstract

Purpose – This study attempts to explain the impact of Fintech on the Asian economies through two main indicators, inflation and unemployment over the period 2011-2014-2017.

Design/methodology/approach – This study uses panel data regression models to explain the relationship between Fintech, inflation as an indicator of currency circulation and unemployment since Fintech has disrupted the labor market.

Findings – Empirical results show a consistently strong and positive relationship between the development of financial technologies and the reduction of inflation and unemployment unless these technologies are actively used. Digital finance has become a new driver of economic development. Therefore, governors should not only improve their economies but also expand their information and communication technologies to develop their digital infrastructure, especially for businesses.

Originality/value – The present study contributes to the existing literature on the impact of disruptive digital innovation on the socioeconomic development of emerging countries. The empirical evidence highlights the importance of distinguishing between active and passive uses of Fintech in order to anticipate its economic impact.

Keywords Fintech, Inflation, Unemployment, Asia

Paper type Research paper

Introduction

Digitization is ranked among the main engines of economic development in the countries (Gonzalez Fernandez, González, & Fanjul-Suárez Velasc, 2020). Several researchers have studied the impact of technology on the economies of countries, such as Jagtiani (2018), Kammoun, Loukil, and Ben Romdhane (2020), Ben Romdhane, Loukil, and Kammoun (2020), Ben Romdhane Loukil, Loukil, and Kammoun (2021), Loukil, Ben Romdhane, Kammoun, and Ibenrissoul (2019). However, other studies focused their research on Fintech, (Haddad & Hornuf, 2019). Fundamentally, Fintech is using technology to provide new and improved financial services. These new financial technologies (Fintech) have burst into the world. The academic literature on Fintech has developed considerably recently but is generally not

JEL Classification — E24, E31, M1

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Arab Gulf Journal of Scientific
Research
Vol. 42 No. 1, 2024
pp. 161-181
Emerald Publishing Limited
e-ISSN: 2536-0051
p-ISSN: 1985-9899
DOI 10.1108/AGJSR-08-2022-0146

linked to a coherent research program. Significant gaps and important questions remain. Much remains to be done before this area becomes an established academic discipline. This paper suggests studying the impact of Fintechs in the context of Asian countries since Asia is well ahead in the adoption of Fintechs services compared to Europe or North America. From 2008 to 2013, investments in Fintech startups in venture capital have increased fourfold. The growing number of new Fintech startups created following the 2008 crisis and their ability to integrate disruptive technologies and offer innovative services in niche segments have attracted venture capital funds. Particularly, Japan has a penetration rate of 69% in terms of online buyer and in China 15.9% of retail sales are made online. Since 2014, Alibaba's interest in the region has grown steadily. In July 2014, Alibaba acquired a 10.32% stake in Sing-Post (a national postal service provider in Singapore) for \$220 m, followed in April 2016 by the acquisition of a controlling interest in Lazada (e-commerce platform in Southeast Asia) for a billion dollars." This article proposes coherent research themes based on a critical evaluation of the existing literature. Our empirical study is the first to highlight the importance of distinguishing between active and passive use of Fintech to anticipate its socioeconomic impact. It contributes to the existing literature on the impact of disruptive digital innovation on the socioeconomic development of emerging countries, more precisely, the empirical study.

Empirical evidence points to the importance of distinguishing between active and passive uses of Fintech in order to anticipate its economic impact. We prove that without actively making digital transactions, we cannot get up to Fintech's advantage in terms of inflation and unemployment reduction. It would be necessary for governments to promote phone use, internet expansion and, most importantly, encourage people to engage in digital transactions actively. In other words, supporting double-sense transactions ensures adherence to the economic cycle. In addition, today's technology does not involve the replacement of humans with machines in the job market. That is why industry experts believe that the analysis will likely improve human capabilities if current technological developments require employees to have new skills. So, we can conclude that if machines and humans worked together, the results would be better. In brief, Fintech has disrupted the labor market, not only by destroying some jobs or creating new job opportunities, but also by transforming work tasks. In a global socioeconomic context characterized, among other things, by the innovation of new ways of regulating the labor market and the persistence of unemployment, a number of questions arise which give rise to in-depth reflection on the future of employment. The empirical research developed in this article draws several political conclusions and recommendations.

The remainder of the paper is structured as follows. The second section describes the literature review. The third section explains the empirical methodology and data set used to test the relationship between Fintech, inflation and unemployment. [Section 3](#) presents and discusses the estimated results. The policy conclusions and implications are shown in the last section.

Theoretical framework

In an economic and financial sphere marked by great upheaval, inflation control and employment management are proving to be extremely delicate and practically complex exercises. Economic theory and previous empirical studies have identified the causes of inflation and the determinants of unemployment.

The study of the causes of inflation remains an important macroeconomic issue for researchers and policymakers. Indeed, understanding the internal and external factors that influence inflation will help policymakers develop strategies to contain inflation and ensure price stability. However, while the theoretical and empirical literature on the causes of

inflation has focused on a number of factors, it has shown inconclusive results. From a theoretical point of view, two main schools of thought, namely Keynesian and monetarist, or neoclassical, thought, have addressed the issue. The monetarists developed the concept of inflation through money. According to monetarists, inflation is caused by an increase in the money supply that is more than proportional to the increase in the production of goods and services (Barro, 1997). Keynesians distinguish between demand-side and cost-side inflation. Demand-pull inflation occurs when aggregate demand for goods and services increases while aggregate supply remains constant or unchanged. The increase in demand may be due to an increase in government spending, household consumption expenditures or additional income coming into the country, such as a trade surplus or capital inflow. Cost-push inflation is caused by rising production costs, such as labor costs (wages) or raw material costs. According to other researchers, inflation can also be caused by the structures of the economic system, such as the malfunctioning of markets or the behavior of actors. With regard to the causes of unemployment, the literature has focused on variables such as active labor market programs, employment protection legislation (EPL), unemployment benefits and the tax wedge. However, these studies differ in several respects. The inclusion of macroeconomic variables in different ways is at the root of these differences. In the work of Belot and Van Ours (2001) only inflation was used as a control variable. In contrast, Nicoletti and Scarpetta (2002) used the output gap as a control variable. In a context of macroeconomic instability, several variables are added to the models in addition to the real interest rate and labor productivity. On the one hand, some microeconomic studies examining different types of labor market programs have indicated that the impact on unemployment varies with the type of program. On the other hand, in the macroeconomic context, some empirical studies have found that interest rates have significant effects on unemployment.

In recent decades, there has been a global trend towards digitization, particularly in Asia, as this technological revolution is solving financial sector problems and improving macroeconomic aggregates (AFD, 2019). Digitalization has played a major role in ensuring the competitiveness of firms and nations. Recently, several researchers have studied the effects of the technological revolution on financial markets and the macroeconomic environment in Asian countries. In this context, Accenture (2016) found that global investment in new technologies in Asia is at 62%. Among the technologies in demand are Fintechs. They are a combination of finance and technology. There are four types of Fintech in the country: mobile payment services, mobile cash transfer services, mobile money transfer services abroad and lending services. Barjot (2018) found that Fintech is essential to the development and creation of innovative applications and new business and financial products. This technology attracts new consumers who prefer to use smartphones or debit or credit cards to conduct financial transactions remotely (Ben Romdhane Loukil *et al.*, 2021). In addition, Truong (2016) found that Fintech is involved in value creation in the world as consumers can use financial services via social media and the internet rather than traditional types of transactions.

The motivation for this research stems from a growing number of empirical studies examining the relationship between Fintech and macroeconomic aggregates. However, the study of the effect of digitalization on inflation and employment remains to be determined. To the best of our knowledge, our study is the first to offer a theoretical and practical explanation that chooses Fintech as an endogenous variable to know the nature of the relationship between this new technology, inflation and unemployment in the Asian region. We chose the Asian region because it is characterized by technological production like China.

The main objective is to explain the relationship between Fintech and inflation and unemployment. We performed econometric modeling based on data from 17 Asian countries to measure this relationship using linear regression in the least-squares sense. Alexander Aitken first described the generalized least squares (GLS) technique in 1934 (Aitken, 1936).

We find that Fintech improves economic development unless we talk about the active use of financial products. Using a behavioral perspective, we contribute to reviewing the current literature on the impact of disruptive digital innovation on the socioeconomic development of emerging countries. Therefore, we do not actively trade digitally; we take advantage of the benefits of Fintech in terms of inflation and reduced unemployment. In doing so, we try to bridge the gap between thoroughness and relevance in our quest to understand Fintech and suggest some practical implications for Fintech practitioners.

In Asia, the participation of information and communication technologies in gross domestic product (GDP) has increased much faster than economic growth, as shown by Iwasaki (2018). Nowadays, the technological revolution is analyzed in articles where we can measure the progress of this sector in the world, Jaewoo and Woonsun (2014), Rezaeian, Hamid, and Roel (2017), Chen, Zhang, Zhu, and Lu (2017) and Loukil *et al.* (2019). Asia is a wealthy region of advanced countries in the technology sector, like China and Malaysia. Among the technological services used, Fintech has excellent added value for the development of countries in general and, particularly, for the financial markets and the economic environment. Fintech combines the terms “finance” and “technology”; it indicates an innovative start-up that uses technology to rethink financial and banking services. Following the economic crisis of 2008, many bankers and traders left the major financial centers of the planet. They are embarking on entrepreneurial adventures to rethink the financial model through technological innovation. Crowdfunding activities, mobile apps and platforms, crypto-currencies and electronic payments are all examples of Fintechs.

That being said, it's worth noting that the study of the economic impact of technologies has received considerable attention in the existing literature. In contrast, little theoretical and empirical work has been done on the economic impact of fintechs. This section depicts the history of Fintech and its emergence in Asia and provides an overview of the relationship between Fintech, inflation and unemployment. The main empirical findings on the link between the three concepts are also presented.

Relationship between fintech and inflation

A thorough review of the existing literature on the main determinants of inflation reveals the demand and supply-side determinants of inflation. These include economic growth (Bruno & Easterly, 1998; Pollin & Zhu, 2005; Eftekhari Mahabadi & Kiaee, 2015; Nigusse *et al.*, 2019), money supply (Mohanty & Klau, 2001; Kandil & Morsy, 2009), wage levels as well as factors such as import prices and oil prices (Mohanty & Klau, 2001; Eftekhari Mahabadi & Kiaee, 2015), government expenditure, exchange rates (Mohanty & Klau, 2001; Kandil & Morsy, 2009; Eftekhari Mahabadi & Kiaee, 2015). In addition to the traditional main determinants of inflation, some researchers studied the impact of Fintech on inflation. Kammoun *et al.* (2020) analyzed the effect of Fintech on economic performance in the context of the political instability of the middle east and north africa (MENA) zone for three years (2011, 2014, and 2017). Empirical results show that FinTech's lending activities increase inflation. According to Xiang, Huang, and Cheng (2019), FinTech significantly affects a country's inflation since it directly influences consumer choice, especially in China and Malaysia. This is due to the ease of transactions, online chat, checking the balance of their account and funds transfers (Taherdoost, 2018). The potential impact of mobile money on inflation has been addressed for the first time by Simpasa and Gurara (2012). They argue that the increase in monetary speed could spread inflation, thus complicating the implementation of monetary policy. Some empirical studies confirm these results.

Moreover, Agarwal (2014) confirmed in his study that Bitcoin could reduce governments' costs of generating income with inflation. These technologies can create a balance in which a digital currency has a positive value. After the financial crisis, several business bankers lost their jobs and have sought new positions to remain competitive in their fields through the

innovation of software applications and innovative products. These results are confirmed by the study of [Mumtaz and Zachary \(2020\)](#). [Narayan and Sahminan \(2018\)](#) studied the impact of FinTech on the Indonesian exchange rate (rupee against the United States (US) dollar) and the inflation rate. Empirical results show that FinTech can reduce inflation and appreciate the rupee against the US dollar. [Jagtiani \(2018\)](#) examined the impact of the Fintech lending platform and consumer credit access based on lending club account-level data and Y-14M data reported by US banks with assets of over \$50 bn. They found that lending club's consumer lending activities have penetrated areas that may be underserved by traditional banks, such as in highly concentrated markets and areas with fewer bank branches per capita. They concluded the share of Lending Club loans is increasing in areas where the local economy is not functioning well.

Digital platforms are redesigning relationships between customers, workers and employers due to the practice of purchasing grocery products online in search of a partner on a dating site. As a growing number of people worldwide participate in the digital economy, we should carefully consider the relationship between Fintech and unemployment.

Relationship between fintech and unemployment

In the literature, studies of the determinants of unemployment generally include variables such as unemployment benefits, EPL and unionization rates. However, these studies show differences in various aspects. The use of macroeconomic variables in different ways is at the root of these differences. In the study by [Nicoletti and Scarpetta \(2002\)](#), the output gap was used as a control variable. In addition, macroeconomic shocks are included in the models with variables of real interest rate, inflation, foreign investment and economic growth ([Nickell, 1997](#)). Recently, some researchers have taken advantage of innovation by studying the effect of new technologies such as Fintech on unemployment.

The decline in employment in existing banks could be significant. This is shown in the study by [Fong \(2017\)](#), who noted that more than 1.8 m workers in US and European banks could lose their jobs after ten years. On the one hand, Fintech services significantly and negatively affect employment worldwide and in Asia ([Thiel & Masters, 2014](#)). They found that the efficiency gains of artificial intelligence and robotics would lead to more than 1 million job losses in Europe. This leads to social tensions by increasing the asymmetry of the income distribution. On the other hand, there are positive effects on firms where technological advances increase their competitiveness, income and employment.

The [IMF \(2018\)](#) noted that significant job disappearances and transformations are likely to be seen across all sectors and levels, including in categories that we thought were sheltered so far. In addition, they confirmed that automation and the increasing use of robots had had an overall positive effect on domestic employment and income growth. Based on data from Japanese prefectures, [Acemoglu and Restrepo \(2017\)](#) confirmed that the increasing density of robots in the manufacturing sector is linked to higher productivity, employment and wages at the local level. In contrast, [Morikawa \(2014\)](#) shows that the quality of services is deteriorating in Japan due to labor shortages. He noted that the sectors most severely affected are parcel delivery services, hospitals, restaurants, elementary and college schools, convenience stores and utilities.

Based on the above developments, this study seeks to answer the following question: what is the role of Fintech in developing Asian countries, given their macroeconomic aggregates and political instability?

Data and methodology

Several motivations are behind our action research. First, Fintech emerges as a value driver through digital innovation with new types of financial services. In this sense, several

researchers argue that financial technologies are living organisms, given that this domain is by nature flexible, changing and not stable. Moreover, these Fintechs have the potential to carry out structural changes, modify some aspects of the system under investigation, and transform business models. Finally, Fintech is not a clearly understood notion by academia and the media. Despite the extensive research on digital technologies in financial services, only a few academic researchers have investigated the Fintech industry and its impact on the Asian economy.

The empirical investigation aims at testing the validity of the assumption of the positive role of digital transformation in the financial sector for the relationship between Fintech and economic development, approximated by inflation and unemployment. We also test the impact of traditional determinants of both economic indicators side to side to Fintech measures. We start with a descriptive analysis to better understand the state of the art in Fintech inclusion in Asia. Then, we test the potential impact of Fintech and traditional determinants on economic indicators such as inflation and the unemployment rate. We use general least square regression to anticipate the proxies' coefficients. We approximate Fintech through mobile money, the use of the internet to make digital transactions and payments, making digital payment and making or receiving digital payment. On the other hand, we approximate degree of financial inclusion through the banking system by the variable bank account, credit card and debit card ownership. We also estimate social welfare using the unemployment rate and consumer price index. Finally, to assess the effect of economic indicators, we include other control variables such as exchange rate, interest rates, human capital index, GDP growth, FDI, gross fixed capital formation and broad money.

Empirical model

Because Fintech is considered a new and fast-growing financial service, there is a lack of understanding studies in this domain due to new and emerging phenomena. In our research, we intend to examine the potential impact of Fintech on economic development. We precisely study the two most common indicators: unemployment measured by the annual rate of unemployment and inflation measured by the annual price index of consumption. To deal with it, we gathered data on 17 Asian countries from the 2017 Global Findex data during 2011–2014–2017 using GLS. This method of linear regression is a generalization of the ordinary least squares (OLS) estimator. It deals with non-BLUE (best linear unbiased estimator) estimators (one of the main assumptions of the Gauss-Markov theorem). It is the case when homoskedasticity and the absence of serial correlation hypotheses are violated. In such situations, the GLS estimator is BLUE. Specifically, GLS models allow us to completely remove the spatial correlation of residuals (Mediero & Kjeldsen, 2014). The GLS regression procedure accounts for differences in available record lengths and spatial correlation in concurrent events by using an estimator of the sampling covariance matrix (Griffis & Stedinger, 2007). They proved that the GLS model is more appropriate than the OLS analysis. Thus, the GLS model is adapted to our estimation.

The GLS method is to minimize the sum of the random squares. The GLS estimator remains one of the most frequently used. It has many uses, and more precisely in the description of the data. They show which variables best reflect the variability of a variable of interest.

Table 1 reports the variable indications and measurements used in this study (see Table 1 below).

In Table 2, we present variable descriptions by analyzing some statistical indicators (mean, standard deviation, minimum and maximum).

A global survey from 2007 to 2017 shows that, on average, the unemployment rate is about 5.39%, slightly lower than the world average (5.9% in 2011, 2014 and 2017) (see [en.statista.com](https://www.statista.com)).

Variables indications	Measurement	Indicator
Unemployment	The annual rate of unemployment	UP
Bank Account	The percentage of respondents who report having an account (by themselves or together with someone else) at a bank or another type of financial institution (see definition for financial institution account) or report personally using a mobile money service in the past 12 months (see definition for mobile money account)	BA
Internet Use to Pay or to Buy	The percentage of respondents who report using the internet to pay bills or to buy in the past 12 months	IU
Debit Card	The percentage of respondents who report having a debit card	DC
Made or Receive Digital payment	The percentage of respondents who report using mobile money, a debit or credit card, or a mobile phone to make a payment from an account, or report using the internet to pay bills or to buy something online, in the past 12 months. It also includes respondents who report paying from or into a financial institution account or through a mobile money account in the past 12 months	DP
Mobile Money Account	The percentage of respondents who report personally using a mobile money service in the past 12 months	MMA
Foreign direct investment	Foreign direct investment, net inflows in reporting economy (DRS, current US\$) Foreign direct investment, net inflows in reporting economy (DRS, current US\$) Foreign direct investment is net inflows of investment to acquire a lasting interest in or management control over an enterprise operating in an economy other than that of the investor	FDI
Gross fixed capital formation	Gross fixed capital formation (formerly gross domestic fixed investment) includes land improvements (fences, ditches, drains and so on); plant, machinery and equipment purchases; and the construction of roads, railways and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings	GFCF
Inflation	The annual price index of consumption	INF
Exchange Rate	Real effective exchange rate index (line reu, 2010 = 100). Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs	EX
Credit card	The percentage of respondents who report having a Credit car	CC
Broad money	Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper	BM
Real Interest rate	The real interest rate is the interest rate on loans adjusted for inflation, as measured by the GDP deflator	RI
Deposit interest rate	Deposit interest rate is the rate paid by commercial or similar banks for demand, time or savings deposits	DI
Loan interest rate	Lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector	LIR
Human capital index	The HCI calculates the contributions of health and education to worker productivity	HCI
Annual GDP growth	Annual percentage growth rate of GDP at market prices based on constant local currency	GDPA
Annual per capita GDP growth	GDP per capita is gross domestic product divided by midyear population	GDPC

Table 1.
reports the variable
indications and
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this study

Table 2.
Descriptive statistics

Variable	Obs	Mean	Std. dev	Min	Max
EX	51	91.8209	22.3377	13.4548	121.4929
RI	50	4.2799	6.5624	-9.8764	24.2052
DI	50	5.6208	3.5140	0.3206	13.9935
LIR	50	10.4936	6.7661	0.85265	29.6467
HCI	51	0.5692	0.1179	0.32	0.844
GDPA	51	4.7590	2.5176	-1.5729	9.5509
GDPC	51	3.5910	2.6561	-2.8471	9.0272
FDI	51	2.7627	2.6960	-.01364	11.8244
GFCF	51	25.3819	6.4332	12.5206	43.8613
DC	51	0.2386	0.2219	0.01658	0.8806
CC	51	0.0947	0.1557	0.00126	0.6838
BM	51	77.2724	59.8395	19.7292	244.0197

Source(s): Authors' calculations

But we notice the high standard deviation, reflecting the remarkable dispersion of the statistical sample values. The following figure shows that Cambodia records the highest unemployment rate in Asia with a percentage of 8.34%, while Nepal presents the lowest rate with a rate of 1% in 2017. Generally, big and smaller cities suffer from the same expected trend of the scarcity of reasonable jobs. The global recession hitting nearly every country due to growing political instability is behind the challenge of unsustainable employment. Concerning other countries, and according to the 2017 Global Least & Most Stressful Cities Ranking report, the unemployment rate is about 4.81% in the Bangladesh capital. According to some researchers, this rate is explained by the scarcity of skills and education (see [Figure 1](#)).

On the other hand, Kathmandu has 8.34% of the population still looking for work and faces the most pressing issue of youth unemployment. Besides the lack of skills among job seekers, the leading cause of unemployment is the lack of promotion of agro-based industries and the agricultural sector. Well-known for its high standard of living, Brunei's capital has the second-highest rate of unemployed people. The public sector can't offer enough jobs for the growing number of workers demanded yearly. In the Philippines, the drug war prevents the government from creating jobs for the ever-increasing population. Even though in Jakarta, the inactive population is declining, there are still 6.26% of people waiting to get jobs. In Pakistan, the rate is higher, with Karachi having a 6.12% unemployment rate despite being the country's leading industrial base.

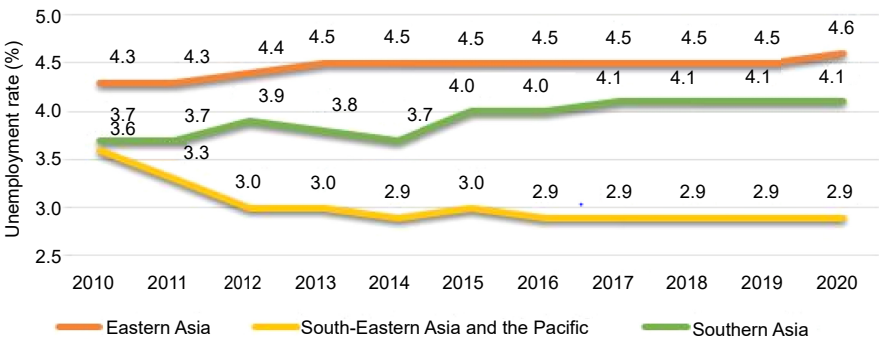


Figure 1.
Unemployment rate
in Asia

Source(s): The International Labor Organization (ILO)

This could be explained by persistent political unrest and a lack of investment. India, the capital of New Delhi, has an unemployment rate of approximately 4.38%. This rate can be partly explained by the fact that people are flocking from all over the country to search for jobs.

Consequently, this rate keeps rising. The unemployment rate has declined in Osaka since it is considered a flourishing labor hub and is even facing job scarcity with a rate of 3.72% of people searching for jobs. Seoul has a current unemployment rate of 3.48%, explained by the slowdown in the economy and the difficulty of growing businesses. Most jobseekers have a degree or diploma and frequently fail to secure desired employment. Shanghai and Japan's busy capital, Tokyo, suffer from heavy populations despite solid technological advancements. As a modern city, Kuala Lumpur is also witnessing slow job growth and a rise in unemployment. India's metro cities like Kolkata, Mumbai and Bangalore still struggle with staggering employment opportunities. This is due to the global economic slowdown. Finally, there is no doubt that high unemployment damages economies and disrupts social structures. So, it is a concern for the government to generate jobs for this demographic.

We now turn to analyzing inflation rates in Asia. Inflation is an extended, sustained increase in the general price level of goods and services in an economy over some period of time. When the price level rises, each currency unit buys fewer goods and services. As a result, inflation reflects a decrease in purchasing power per unit of money – a loss of real value in the economy's medium of exchange and unit of account. A chief measure of price inflation is the inflation rate, which is the annualized percentage change in a general price index (usually the consumer price index) over time. During the last five years, the food inflation rate fell from 5.2% in 2014 to 3.6% in 2018. There has been a slowdown in food inflation, which has moved almost continuously since 2016, from a peak of 5.4% in April 2016 to a low of 0.9% in June 2017.

Food inflation registered an upward trend in 2018, from 3.0% in January to 5.4% in August; it decreased significantly to 1.1% in December 2018. The same pattern has been observed in South and Southeast Asia. However, Western Asia has experienced consistent high food inflation of 7.6% since February 2015, rising to 10% in December 2017.

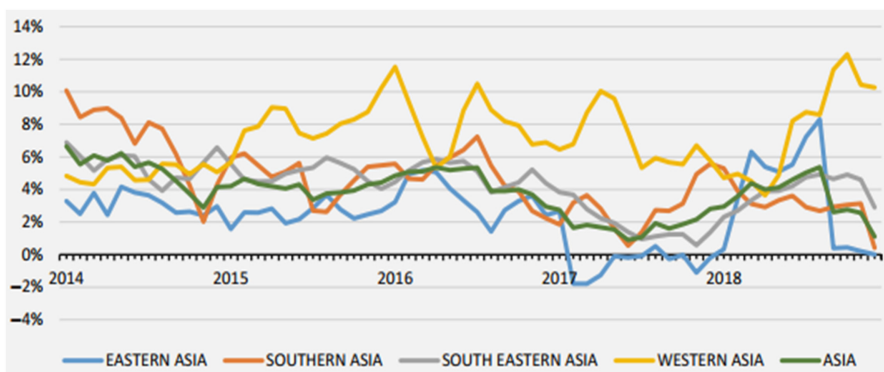
Before rising to a peak of 8.3% in August 2018, the inflation rate in Eastern Asia was the lowest in Asia from January 2014 to January 2018. This is explained by the fall in agricultural commodity prices. On the other hand, these factors are significant in explaining food inflation trends in the region and country-specific. More importantly, the overall food inflation rate in the area can be explained by the slow evolution of food prices in China and India, which are considered the main drivers in Eastern and Southern Asia. In contrast, Turkey was primarily responsible for the rise in Western Asia's inflation rate due to an increase in nonprocessed food prices, particularly fresh fruit and vegetable prices. The same growth was also captured in red meat and white meat, as well as in rice and legumes (see Figure 2).

Model specifications and results

In the present study, we intend to test two principal hypotheses through linear models as shown below:

$$\begin{aligned}
 UP_{i,t} = & \beta_0 + \beta_1 BA_{i,t} + \beta_2 IU_{i,t} + \beta_3 DC_{i,t} + \beta_4 DP_{i,t} + \beta_5 RDP_{i,t} + \beta_6 MMA + \beta_7 GFCF_{i,t} \\
 & + \beta_8 HCI_{i,t} + \beta_9 GDPA_{i,t} + \beta_{10} GDPC_{i,t} + \beta_{11} FDI_{i,t} + \varepsilon_{i,t}
 \end{aligned} \quad (1)$$

Figure 2.
Inflation rates in
different Asian regions



Source(s): IMF, UNSD, and national statistics websites; FAO Statistics Division for the calculation

$$\begin{aligned}
 INF_{i,t} = & \beta_0 + \beta_1 BA_{i,t} + \beta_2 IU_{i,t} + \beta_3 DP_{i,t} + \beta_4 CC_{i,t} + \beta_5 MMA_{i,t} + \beta_6 RDP_{i,t} + \beta_7 BM_{i,t} \\
 & + \beta_8 GDPA_{i,t} + \beta_9 GDPC_{i,t} + \beta_{10} RI_{i,t} + \beta_{11} DIR_{i,t} + \beta_{12} LIR_{i,t} + \beta_{13} EX_{i,t} + \beta_{14} DC_{i,t} \\
 & + \varepsilon_{i,t}
 \end{aligned} \tag{2}$$

where:

β_0 : intercept or constant amount;

β_i : coefficients of the explanatory variables;

ε : error term.

We tested the two following hypotheses:

- H1. In addition to the traditional determinants, Fintech, as an innovative and sophisticated technology, enables job creation through new investment opportunities.
- H2. In addition to the traditional determinants, Fintech, as a crowdfunding technology, marketplace lending (MPL), and peer-to-peer (P2P) lending process, could increase monetary speed and spread inflation.

To test these two hypotheses, we employed the GLS since this technique allows estimating the unknown parameters in a linear regression model when there is a certain degree of correlation between the residuals in a regression model. Alexander Aitken first described the GLS technique in 1936. In fact, in statistics, GLS is a technique for estimating the unknown parameters in a linear regression model when there is a certain degree of correlation between the residuals in a regression model. In these cases, OLS and weighted least squares can be statistically inefficient or give misleading inferences.

The GLS estimator is unbiased, consistent, efficient and asymptotically normal with:

- (1) $E(\hat{B}/X) = \beta$
- (2) $Cov(\hat{B}/X) = (X^T \Omega^{-1} X)^{-1}$.

GLS is equivalent to applying OLS to a linearly transformed data version. For instance, factor $\Omega = CCT$, for instance, uses the Cholesky decomposition. Then if we premultiply both sides of the equation,

$$y = X\beta + \varepsilon \text{ by } C^{-1}$$

We get an equivalent linear model:

$$Y^* = X^* \beta + \varepsilon^*$$

where:

- (1) $Y^* = C^{-1}Y$,
- (2) $X^* = C^{-1}X$, and
- (3) $\varepsilon^* = C^{-1}\varepsilon$

In this model, $\text{Var}(\varepsilon^*/X) = C^{-1}\Omega(C^{-1})^T = I$, where I is the identity matrix. Thus, we can estimate β efficiently by applying OLS to the transformed data and minimizing $(Y^* - X^*\beta)^T(Y^* - X^*\beta) = (Y - X\beta)^T \Omega^{-1}(Y - X\beta)$.

This has the effect of standardizing the scale of errors and “de-correlating” them. Since OLS is applied to data with homoscedastic errors, the Gauss–Markov theorem applies, and therefore, the GLS estimate is the BLUE for β .

Before running our models, we present the Pearson correlation results for all the variables. Generally, pairwise correlation coefficients are low for the two models. A high correlation is considered when the correlation coefficient exceeds 0.80. [Gujarati \(2003\)](#) points out that multicollinearity may be problematic when the correlation exceeds 0.80 (as cited by [Kennedy, 1992](#)). The low correlation coefficient indicates the absence of multicollinearity problems in the analysis.

We analyze the potential impact of Fintech on the unemployment rate, which is the most pleaded social cause, especially among the young and recently graduated. The regressions explanatory power (R -squared) is relatively high 0.5389, 0.2757 and 0.5191, which indicates that the explanatory variables included in the two models (1 and 3) explain more than 50% of the variation in unemployment. Also, the Fisher test confirms the global significance of the results, while the Breusch-Pagan/Cook-Weisberg test for heteroscedasticity concludes without such a problem (see [Table 3](#)). Our empirical results allow us to confirm the [first hypothesis](#) through the estimation of the models 1 and 3 where we respectively estimate the combined effect of both Fintech’s measures and the traditional determinants of unemployment and then the isolated effect of Fintech.

Regarding the analyses of the results of the traditional determinants of the unemployment, we find that Annual GDP growth has a negative impact at 5% while Annual per capita GDP growth has a positive impact at 10%. On the other hand, we find that Human capital index has a negative effect on unemployment at 10%. We can conclude that spending on health is necessary to improve labor productivity. As a result, higher levels of employment opportunities result in both strong human capital and better economic growth rates.

Furthermore, the results emphasize the positive impact of Fintech on social indicators through job opportunities. But we notice some divergence in the causality sense between Fintech proxies and the unemployment rate. While opening a bank account and making or receiving digital payments are all negative and significant at 1%, and 5%, respectively, the variables “internet use to pay” and “making digital payments” are positive and significant at 10% and 5%, respectively.

These disparities could be explained in part by the nature of Fintech applications. This means that the unemployment rate will significantly decrease unless there is the active use of

Table 3.
Impact of Fintech and
traditional
determinants on
unemployment

Unemployment	Model 1			Model 2			Model 3		
	Coefficient	$p > z $	[95% conf. Interval]	Coefficient	$p > z $	[95% conf. Interval]	Coefficient	$p > z $	[95% conf. Interval]
GdPA	-0.5003	0.324	0.5003	-1.0213**	0.048	-2.0344	-0.0082		
GdPC	0.5660	0.248	0.5665	1.0338**	0.038	0.05669	2.0109		
HCI	0.2622	0.951	0.2622	-8.1736**	0.036	-15.8002	-0.5471		
FDI	-0.0168	0.915	-0.0168	-0.09233	0.546	-0.3918	0.20721		
GFCF	0.0350	0.507	0.0352	0.01883	0.761	-0.1026	0.14033		
BA	-5.512***	0.001	-5.5127					0.000	-8.3045
IU	1.6017	0.655	1.6012					0.010	-1.4867
DP	-7.3234**	0.046	-7.3237					0.019	-12.9752
MDP	8.8117**	0.048	8.8117	8.8117**				9.11294	9.11294
MMA								-1.0811	-1.0811
cons	7.3245***	0.009	7.3245	7.3245***	0.000	5.678726	16.2607	0.0254	7.6584
R-squared			0.5389			0.2757		0.5191	
χ^2 (p-value)			30.69 (0.000)			9.28*** (0.08)		34.22(0.000)	
Note(s): * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$									
Source(s): Authors' calculations									

these financial technologies, like making digital transactions. Fintech, being a Greenfield industry for expanding new innovative ideas and start-ups, allows job creation and consequently participates in reducing the unemployment rate. [Kammoun et al. \(2020\)](#) confirmed our findings. They found that financial and investment freedom flourishes and expands whenever there is an expansion of Fintech. This has a direct impact, especially on hiring young graduates. [Nepote-Cit, Ruberti, and Tran \(2018\)](#) have shown that technological development based on application innovations such as Fintech supports investment and therefore lower unemployment rates. Thus, our results have implications for decision-makers like governments and entrepreneurs. They are invited to invest in digital solutions since the digitization of processes saves time. It will allow the management of low-added-value tasks, often time-consuming and avoid the phenomenon of “re-work.” These types of investments need a qualified workforce. On the one hand, digitization responds to the growing needs of large companies to increase efficiency. On the other hand, it responds to customers’ expectations (through automated appointment systems, online information and sales platforms, interactive terminals and tablets, etc.) and employees’ (e-learning, intelligent production of information documentation, tablets, mobiles, collaborative project monitoring tools, etc.).

Emerging markets represent the greatest opportunities for Fintech companies. “Southeast Asia is particularly attractive because it has a very tech-savvy population and governments that welcome new technologies,” said Stephanie Barbaglio, director of Cassiopeia. This service agency works on various projects in emerging markets. Asian nations are reportedly among the hottest spots for Fintech opportunities. Growing economic activity and government incentives are attracting FinTech solutions to multiple sectors (see [Figures A1 and A2 in appendix](#)). Reports show an optimistic outlook for companies in digital banking and payments, artificial intelligence (AI) and blockchain.

A report from Deloitte published on December 31, 2018, estimated that Fintech investments in Southeast Asian countries in 2018 have exceeded the \$5.7 bn invested in 2017 by up to 30%. Google’s economy SEA (Southeast Asia) report anticipated the Internet economy in Southeast Asia² to have increased by 44% in 2018. This robust growth will continue as the Fintech market is projected to reach US \$72 bn by 2020. Investment in technology is substantial in the area: technology firms represented 40% of total private equity deals in Southeast Asia in 2017. Over \$2 bn was invested in Asian tech companies in Q1 2018, and more than 60% of Southeast Asian investors say technology was their focus area in 2018–19. Fintech is the largest subsector, followed by AI and Blockchain.

Considering the impact of Fintech and fundamental determinants on inflation, we globally prove the relatively high explanatory power (R-squared) of the regression 1 and 3 (0.5144) and (0.4091) where we estimate both the combined effect of Fintech and traditional determinants of inflation and the isolated effect of Fintech. Such values indicate that the explanatory variables included in our models explain more than 40% of the variation in inflation. On the other hand, the Fisher test confirms the global significance of the results. In contrast, the Breusch-Pagan/Cook-Weisberg test for heteroscedasticity concludes for the absence of such a problem.

Considering the effect of traditional determinants of inflation, we find in the first and second models that exchange, real interest rate, deposit interest rate, annual GDP growth and broad money of GDP have negative impact on inflation. These findings allow us to draw interesting implications. Firstly, inflation targeting should be seen as an intermediate objective of monetary policy because economic activities are not significantly inflationary. Secondly, the inflation targeting strategy can be applied in the short to medium term provided that there is a very strong correlation between inflation and real activity in order to alternate inflation targeting with the incentive to finance investment projects, which will promote the development of an industrial fabric prior to monetary sovereignty. To improve

the economic effect of monetary policy, it is necessary to combat the high variability of the interest rate, which is a source of unexpected and severe inflation. The inability to forecast could cause an economic recession.

Forecasting inflation is challenging in emerging markets, where trade and monetary regimes have shifted. Particularly in Asian countries, we find that passive digital transactions measured by Made digital payments, Internet Use to Pay and debit card increase significantly and respectively by 10%, 10% and 5% the level of inflation in Asian countries. But, financial inclusion through the access to bank accounts reflecting the ability of individuals and businesses to access a range of financial products and services has a reducing impact on inflation at the level of 1%. First, the relationship between mobile money and inflation is highlighted by [Aron, Muellbauer, and Sebudde \(2015\)](#). Their sample concerns Uganda from 1994 to 2003 and uses multivariate models across equilibrium correction terms. They discovered that the domestic money supply had no effect on food and fuel inflation but had a negligible impact on nonfood inflation. They also prove that these models could be helpful for short-term inflation forecasting. But they couldn't find any serious evidence of a link between mobile money and inflation. As a result, the money supply grows during booms much faster than output. They can then be countered by using a contractionary policy, thus reducing inflation.

Besides, the results prove that the active use of Fintech through the double sense of transactions (selling and buying) approximated by made or receive digital payment allow to control inflation through a significant reducing effect at 10%. In the same line of thoughts, we interestingly find that Debit card use increases inflation while the credit card has a negative effect.

According to [Anagnostopoulos \(2018\)](#), "The underlying consumer impact, on the one hand, is expected gains in overall consumer welfare due to the reduced costs of banking and investment; increased access and convenience; and personal banking offered by the new contestants." Precisely, we find that having a bank account and actively using digital technologies decreases the inflation rate. So, the passive use through the simple action of buying or consuming as Internet use to pay, made digital payment and Debit card have a positive and significant impact at 10% level. Those findings could be explained, in part, by the divergence of results through a literature review concerning the impact of Fintech on inflation. To illustrate the behavior of inflation, we should consider that mobile money is a recent financial innovation offering financial transaction services via a mobile phone, including unbanked people. [Mohamed Sheikh, Oyagi, and Tirimba \(2015\)](#) studied the relationship between effective inflation control and mobile money. They suggest several recommendations for mobile money transfers, such as the use of carefully crafted policies and procedures. Fintech could be an inflation control tool for central banks. In the same vein, [Walker \(2016\)](#) postulates that mobile phones have an important impact on micro and macro levels. Several studies support that financial innovations reduce the incompleteness of markets. This meant that monetary authorities could usefully move from headline inflation to core inflation (see [Table 4](#)).

Compatible with our findings, mobile money does not lead to high inflationary risks. [Mawejje and Lakuma \(2017\)](#) found that active use of Fintech has a reducing effect on inflation. This result is also explained by [Nampewo and Opolot \(2016\)](#), who found that there is an increase in money speed when mobile money does not increase value-added. Mobile money can affect interest rates as it leads to the creation of credit by commercial banks. Another explanation has been proposed by [Erosa and Ventura \(2002\)](#). According to the authors, financial innovation determines a household's portfolio choice of monetary and nonmonetary assets and liabilities, thereby reducing the cost of holding nonmonetary debt. The empirical studies by [Mulligan and Sala-i-Martin \(2000\)](#) and [Attanasio, Guiso, and Jappelli \(2002\)](#) corroborate their findings. These results are confirmed with the study by [Narayan and](#)

Table 4.
Impact of Fintech and
traditional
determinants on
inflation

Sahminan (2018) which found that digitalization plays an important role in lowering inflation, as it reduces costs. On the other hand, Ben Romdhane Loukil *et al.* (2021) confirmed that mobile money has a positive effect on rising inflation for MENA countries. Overall economic activity will be supported, since mobile money leads to economic efficiency through a reduction in transaction costs and a better allocation of resources and credit.

The table indicates that if inflation is coming from external trade (imported inflation), it is exchange rate stabilization that will be important, provided that the currency is not convertible at a known and fixed parity (the need for its own currency). In this case, policymakers need to prevent inflation from becoming excessive by addressing existing and potential supply bottlenecks and correcting sectoral imbalances that could reinforce inflationary pressures.

Our results motivate policymakers to support and encourage the spread of mobile phones and active digital transactions in the countries of the Asian Community. The dependence of financial institutions on third-party data service providers (for example, data provision, cloud storage and analysis, and physical connectivity) for primary operations is currently estimated to be low. However, this deserves continued attention from the authorities.

Consequently, these new entrants to the Fintech financial services sector could significantly change the world of financial service providers since competition in the areas of loans, payments, insurance, trade and other services can create a more efficient and resilient financial system. The government is partnering with big banks and Fintech to speed up payments. Ultimately, this increased collaboration could lead to a more seamless distribution of government benefits, greater access to lending programs, and even a digitized currency. "Public-private partnerships are typically finance-type arrangements, like building a toll road or bridge," said Miguel Gamiño, Mastercard's head of global cities. "The pandemic forced some conversations to happen more quickly than what would've happened in a pre-COVID world, and now we're continuing to develop beyond emergency scenarios."

However, increased competition could also pressure financial institutions' profitability, leading to additional risk-taking by incumbents to maintain margins. Further research could be applied to understand these profound impacts better.

Conclusion and practical implications

Fintech is becoming increasingly important in shaping the financial and economic landscape. This innovation is disruptive and is not free from risks. It uses technology-integrated business models to provide financial services to customers more cost-effectively and conveniently than traditional financial service providers. Fintechs derive their success from local constraints and the rise of the mobile phone, but there is still a long way to go to achieve a truly inclusive ecosystem. The main purpose of this paper was to study the relationship between Fintech and the main macroeconomic aggregates, namely inflation and unemployment, in the case of certain Asian countries, using data specified for 2011–2014–2017. Using a behavioral perspective, we contribute to reviewing the current literature on disruptive digital innovation's impact on emerging countries' socioeconomic development. The empirical research developed in this article draws several political conclusions and recommendations.

With regard to the traditional determinants of inflation for Asian countries, the results show that the exchange rate, real interest rate, deposit interest rate, annual GDP growth and broad money GDP have a negative impact on inflation. The study of the impact of Fintech on inflation shows that the active use of Fintech through the two-way transactions (sale and purchase) reconciled by the digital payment made or received has a reducing effect on inflation. Whereas, passive use through the simple action of buying or consuming such as using the internet to pay, made digital payment and debit card have a positive and significant

impact on inflation. Regarding unemployment, it can be concluded that the growth rate is very important to explain unemployment because it shows the general situation of the Asian economy. Therefore, based on the relevant studies and theory, it is confirmed that high GDP growth rates reduce the unemployment rate. In addition to job creation, FDI is also found to improve the quality of the host country's workforce through on-the-job and overseas training offered by multinationals to their employees. Indeed, the training of workers improves the competence and know-how of the local population thanks to new skills and work methods.

Based on the foregoing findings, our empirical study is the first to highlight the importance of distinguishing between active and passive use of Fintech to anticipate its socioeconomic impact. We prove that without actively making digital transactions, we cannot get up to Fintech's advantage in terms of inflation and unemployment reduction. It would be necessary for governments to promote phone use, internet expansion and, most importantly, encourage people to engage in digital transactions actively. In other words, supporting double-sense transactions ensures adherence to the economic cycle. In addition, today's technology does not involve the replacement of humans with machines in the job market. That is why industry experts believe that the analysis will likely improve human capabilities if current technological developments require employees to have new skills. So, we can conclude that if machines and humans worked together, the results would be the best.

This study is beneficial for academics, researchers and policymakers in devising a regulatory mechanism for cryptocurrencies, including Fintech incentives, which can be executed considering the speed of income, monetary policy demand for money, the output gap and monetary policy. Therefore, governors should improve their economies and expand their information and communication technologies to develop their digital infrastructure, especially for businesses. To achieve economic progress, the decision-makers of these countries should strengthen their countries' research and development activities, technological capacities and digital infrastructure. In addition, regulators in these countries should create an environment conducive to innovation and work diligently and thoughtfully through Fintech to ensure consumer protection and financial stability. To put it briefly, the development of Fintechs in the region now raises the question of the insertion of strict laws and regulations for creating new Fintech services, especially in security and privacy practices.

All this would require closer collaboration with like-minded governments in the Asian region on standards and consumer awareness of surveillance risks. Indeed, if consumers understand these risks, they are more likely to prefer Fintech services. Furthermore, let's suppose government policy interventions successfully protect this sector. In that case, the number of investors in this field will grow, and this technology sector could become an economic development force for Asian countries. Finally, another direction for future research would be to explore the relationship between digital finance (Fintech) and foreign direct investment to find out if Fintech helps attract investors who do not have a digital infrastructure in their countries to take advantage of this financial benefit.

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Appendix 1

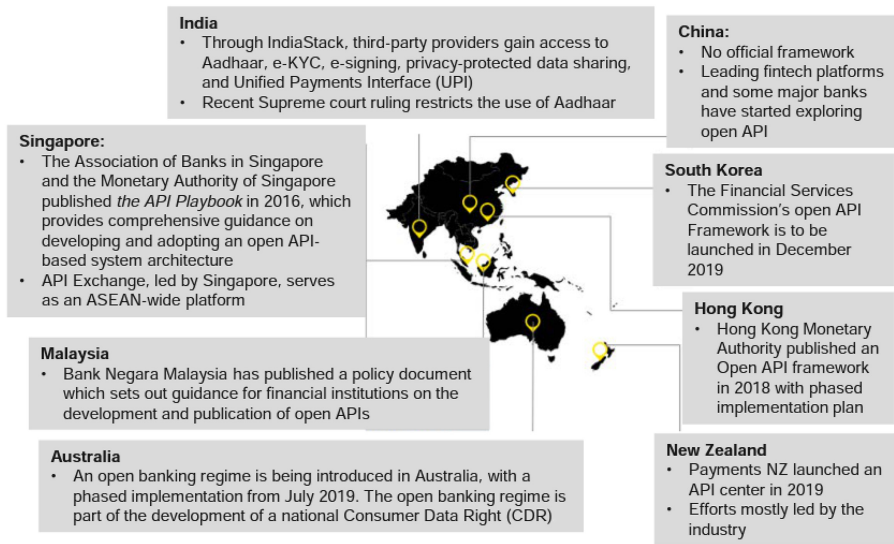
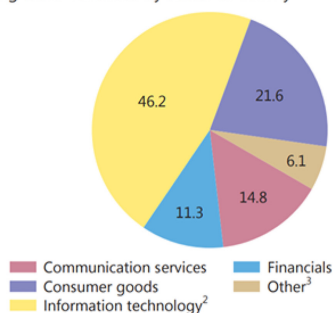
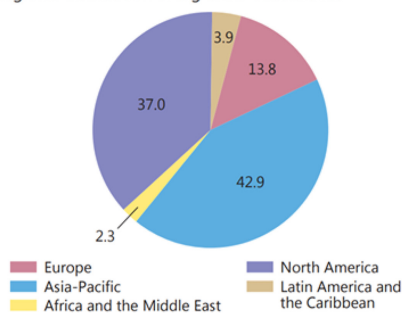


Figure A1.
Open application
programming interface
(API) initiatives in Asia

Note(s): An open API is a publicly accessible application programming interface that provides developers with programmable access to a proprietary software application or web service

Source(s): World Bank documents

In per cent

Big techs' revenues by sector of activity¹Regional distribution of big techs' subsidiaries⁴

The sample includes Alibaba, Alphabet, Amazon, Apple, Baidu, Facebook, Grab, Kakao, Mercado Libre, Rakuten, Samsung and Tencent.

¹ Shares based on 2018 total revenues, where available, as provided by S&P Capital IQ; where not available, data for 2017. ² Information technology can include some financial-related business. ³ Includes health care, real estate, utilities and industrials. ⁴ Shares are calculated on the number of subsidiaries as classified by S&P Capital IQ

Source(s): World Bank documents

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Figure A2.
Big tech in finance

Corresponding author

Youssra Ben Romdhane can be contacted at: youssrabenromdhane776@hotmail.fr

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