Development Studies Series DP21-05

Did Financial Consumers Benefit from the Digital Transformation? An Empirical Investigation and a Case Study

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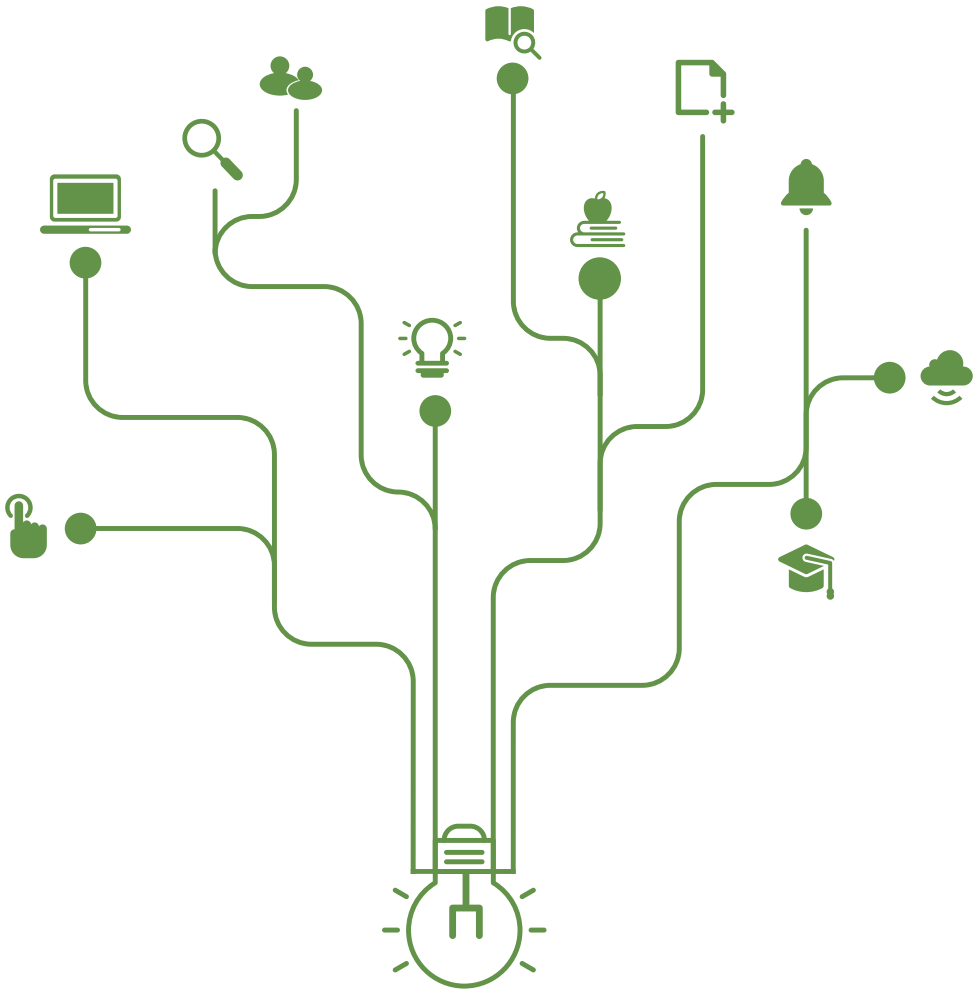

KDI SCHOOL
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Submitted as a part of the final report to the KDI School sponsored research project

First draft: May 24, 2021

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An Empirical Investigation and a Case Study

Abstract

This study aims to document the inter-linkages between two on-going global trends through an empirical investigation – (1) the rapid advancement of the ICT-driven innovations in delivering various types of financial service, and (2) the growing legal and regulatory efforts to protect consumers in the financial markets, after the recent financial crisis in particular. To that end, we compile a set of macro-level indicators on the aggregate outcomes of the financial service sector in Korea during the last three decades, and conduct a regression analysis to gauge the effects of the digital transformation (DT) in the country on those indicators. Using an ARDL-ECM as our empirical model, our results show that: Over time, the unit cost for financial intermediation in the country tends to move in tandem with the growth of economic output, although the profit portion of the cost did not exhibit a long-term relationship with the GDP trend; The long-term effect of the DT trend is negative (i.e., cost-saving) for labor input and capital expenditure, which are shown to be statistically significant, and, as a consequence, its impact on the total intermediation cost is also positive and statistically significant. Based on the above outcomes, we elaborate their implications in designing a set of policy instruments to protect financial consumers, and also discuss the Vietnamese case as an illustration to extend this type of macro-level analysis for the purpose of coming up with a policy regime for financial consumers in an emerging-market context.

Keywords: Digital transformation, financial consumer protection, Error Correction Model (ECM), and financial consumer policies

1. Introduction

During the last fifteen years or so, there have been two inter-related global trends that are making a profound impact on the financial service sector in most countries: first, the rapid advancement of the ICT-driven innovations in delivering various types of financial service, which is often labeled as FinTech (or Financial Technology) that encompasses such areas as P2P lending and crowdfunding, mobile payment, cryptocurrencies, robo-advisors, InsurTech, and RegTech[1]; and, second, the growing legal and regulatory efforts to protect consumers in the financial markets, as evidenced by such legislations as the Dodd-Frank Wall Street Reform & Financial Consumer Protection Act of 2010 as well as those "good" (not necessarily the best) practices suggested by G20 (2010), OECD (2011), the World Band (2012), and EU (2014) and (2019). Given these on-going trends, this study aims to tackle two particular research questions, for the purpose of documenting the inter-linkages between the two on-going trends: What impact does this trend of DT on aggregate (or macro-level) outcomes of financial service sector as a whole in a given country, and what implications can we draw from findings of this kind of macro-level analysis as to designing and implementing a policy regime for financial consumer protection (FCP)?

To that end, we compile a set of indicators of the aggregate outcomes of the financial service sector in Korea during the last three decades, and estimate their correlations with a proxy of DT trend in the country. In so doing, the method put forth by Philippon (2015) and (2016) was employed, which involves with computing the unit cost of financial intermediation, i.e., an aggregate cost in providing the service during a given time period (a flow measure) divided by total monetary value of financial service at the end of the period (a stock measure). However, we also attempt contribute to the literature by decomposing the unit cost into its sub-components – wage (or labor cost), capital expenditure, and profit elements, and use those sub-categories in our empirical analysis. Based on the outcomes, we elaborate a meaningful set of FCP indicators that can be used in an inter-country comparison, and discuss the Vietnamese case as an illustration and as a possible extension of our data analysis.

As a background, it is well-established in the literature that there is generally an endogenous, or mutually-reinforcing, relationship between financial development (or financial market deepening) and economic growth. (King and Levin (1993), Rajan and Zingales (1998), Manning (2003), Pagano and Pica (2012)). Korea is no exception to that general rule: that is, the three key service sectors for financial consumers – banking (deposit and lending services), insurance, and investment – all exhibit a steady and substantial growth path along with the GDP growth since the taking-off of the economic growth since the 1960s. And, as in the case of many emerging-market countries, the financial sector played (or was strongly guided by the government to play) a direct role to promote socio-economic growth, as evidenced by the various credit programs for export-generating sector in the country during the high-growth periods of 1970s to 1990s. However, starting from the 1980s, various measures of the financial liberalization were implemented, which were accelerated after the Asian Financial Crisis (AFC) in 1997~99. In consequence, the sector has grown substantially after AFC in terms of both size and diversity (in the products offered). However, as argued by the recent literature, that sectoral growth does not appear to have contributed to the key macroeconomic outcomes in any meaningful fashion,

[1] See Cho (2020) for a survey on the recent literature on the social effects of the FinTech sector.

such as industrial productivity or income·wealth inequality in the society, both of which are in fact shown to be deteriorating during the last two decades. (Park et al. (2021))

In this study, we aim to test whether or not the price of the service has been too high or justifiable, in a similar vein as the investigation done by Philippon (2015) and, further, what implications those macro-level performance outcomes of the sector have for the welfare of financial consumers. For the empirical analysis, we execute ARDL-ECM (Autoregressive Distributed Lag Error-Correction Model) to investigate the short-run and long-run impact of digital transformation on three variables - (1) labor cost for financial service, (2) capital expenditure for financial service, and (3) total cost for financial service. The specific models for the three variables are selected from number of trials to meet assessment criteria, and we check the stability of our models based on the cumulative sum of squares (CUSUMQ) in residuals, as put forth by Brown et al. (1974), and Stamatiou and Dritsakis (2014). Our results show that: Over time, the unit cost for financial service moves in tandem with the trend of GDP growth of Korea, although the profit portion of the cost did not have a long-term relationship with the DT trend; The trend saves 0.0169%p of labor cost, and 0.000955%p of capital expenditure (both measured as a ratio to unit cost for intermediation); The long-term impact of the DT trend on total service cost is estimated to be a 0.018%p decrease, which is similar to the sum of savings in labor cost and capital expenditure. From the above results, we conclude that digital transformation caused consumer's benefit mainly by achieving operation efficiency of labor from the late 1990's to 2000's in Korea. Actually, the total number of employees in financial industry fluctuated during our analysis window, and the wage per employee has constantly increased. However, the amount of intermediation (quantity of financial service) per employee increased much higher than the increase in salary per person, resulting in decrease in labor cost per intermediation.

The rest of the manuscript consists of the following five sections: literature review (Section II); description of data and variables (Section III); discussion of the empirical results (Section IV); a case study on Vietnam (Section V); and, concluding remarks (Section VI).

2. Literature Review

The financial sector development in Korea

A well-functioning financial service sector is crucial, both in a micro sense of consumer welfare and in a macro sense of economic and social development. As is documented in the literature, there is generally an endogenous, or mutually-reinforcing, relationship between financial development (or financial market deepening) and economic growth: that is, a positive association between the size of private credit and the GDP growth rate is fairly well-established, which is more pronounced in developing countries than developed ones. (King and Levin (1993), Rajan and Zingales (1998), Manning (2003), Pagano and Pica (2012)). In addition, an inverse U-shaped relationship between economic growth and the ratio of private credit to GDP is also documented, implying that the financial market deepening can have a detrimental effect on the growth after a certain threshold (e.g., the 100% of the ratio of private credit to GDP as reported), possibly due to an overinvestment in the sector that is generally viewed as non-trading (or less productive) segment of economy. (Cecchetti and Kharroubi (2012), Arcand et al. (2012), and Cournède and Denk (2015))

After the recent financial crisis, there has been an argument in the literature that the price of financial service has been too high (at least in the U.S.) vis-à-vis its direct input costs, and that the operational efficiency thereof should be substantially enhanced. In particular, Philippon (2015) and (2016) estimate the unit cost of providing the financial intermediation in the U.S., and document that the sector has been too expensive (or over-priced) since the early 1980s, and that, as a remedy for the efficiency gain, the disruptive innovations introduced by the FinTech industry can contribute to restoring the efficiency of the sector by posing a heightened competition and contestability to existing financial institutions. As a related point, there has also been an argument for more innovative and specialized business models in the financial service sector, including a "narrow banking" model, for which FinTech is viewed as a potential driver to that end. (Pennachi (2012), Chamley et al. (2012), and Cochrane (2014))

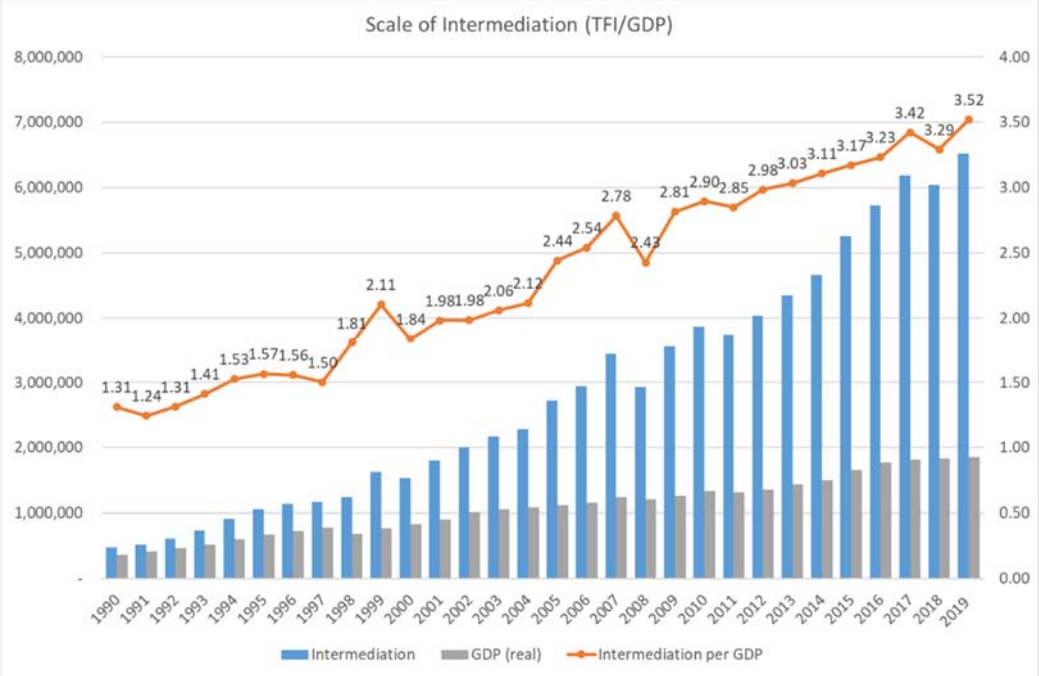
As an emerging-market perspective, the financial service sector in Korea has been deepening as the aggregate economic output was growing for a sustained time period (in fact, from the 1960s). To illustrate, the three key service sectors for financial consumers – banking (deposit and lending services), insurance, and investment – all exhibit a steady growth path along with the GDP growth: as shown in Appendix 1, the size of total household lending (as a % to GDP) has grown from 3.6% in 1975 to 99.1% in 2018; the size of insurance and pension together from 1.3% to 78.2% during the same time period; the total capitalization in the stock market from 100% in 1997 to 1,400% in 2018; and, reflecting the growing liquidity in the economy, the market interest rates also show a steady decline since the outset of the new century, from the two-digit figures in 1990s to the 2~3 APR ranges right now. In the recent years, however, there has been a concern about the size of household lending sector because it has been growing too much and too fast, which, as is believed, has passed "the threshold" of the inverse U-shaped correlation pattern as documented in the literature (Hwang (2020)).

While two pillars of financial regulation – the prudential rules (e.g., the Bale-type risk-based capital regulation) and the business conduct controls (e.g., various FCP measures) are dominant public policy issues in the developed economies, a direct role of the financial sector in socio-economic growth, and a strong grip on the part of the government to that end, have long been key policy concerns in Korea and other emerging market

countries. For example, during the high-growth periods of 1970s to 1990s, the social role of the sector in Korea was mainly to support the export-generating sector, which is often termed as the Directed Credit Policy (DCP).[2] However, starting from the 1980s, various measures of the financial liberalization were implemented, which were greatly accelerated after the Asian Financial Crisis (AFC) in 1997~99. In consequence, the share of the deposit-taking FIs, the commercial banks in particular, in the consumer lending sector has gone up dramatically, from about 30% before AFC to over 70% after the crisis (78% in 2008 and 73% in 2018). This outcome is mainly caused by two forms of financial liberalization after AFC – a shift from the financial repression policy toward household lending sector (to promote the export-generating corporate lending sector, to which the scarce financial resource was directed from 1960s) and a lift of those restrictions on the real estate backed and other types of consumer lending by the commercial banks. However, as argued in the literature, the growth of the financial service sector after AFC, in terms of both size and diversity (in the products offered), has not contributed to the macroeconomic outcomes, such as increasing industrial productivity or narrowing income and wealth inequality in the society. (Park et al. (2021)

In this study, we aim to test whether or not the price of the service has been too high or justifiable, in a similar vein as the investigation done by Philippon (2015) and, further, what implications those macro-level performance outcomes of the sector have for the welfare of financial consumers. As a trend to illustrate, Figure 1 shows the total (value) of financial intermediation (or size of the total intermediated asset) as a multiple to GDP, which shows a steady increase from 1.31 in 1990 to 3.52 in 2019. (The measurement details will be discussed in Section 3).

Figure 1. Intermediated Asset over GDP



[2] See Park et al. (2021), among others, for more details on DCP.

Source: Bank of Korea

FCP, financial inclusion, and the DT trend

As to the FCP policy, the regulatory authorities in Korea initiated a fairly comprehensive set of policy measures that pretty covers almost all provisions identified by the existing literature as good practices, with some them being instituted even before GFC. (Cho et al. (2017)) For a while, the distinction between policies for consumers in general and those for financial consumers was blurred, which is now changed with a clearly-defined regulatory authority, as well as a growing number of academic researchers, for the latter. One milestone event for the FCP policies in the country is the passage of the FCP Act of 2020 in March (and in effective in March 2021), which happened due in large part to the well-publicized cases of incomplete sale in the private equity fund sector of the country.[3] One particular aspect of the law to note is "the same-function-same-regulation" principle: that is, as long as financial institutions selling financial products or providing financial advice engage in the same activities or conduct, same regulations should apply to all financial institutions, regardless of their types and of the products sold, which represents a departure from the previous subsector-specific regulation (e.g., banking, insurance, securities, credit cards, and mutual savings). Given that the law has been implemented fairly recently, it remains to be seen how effective this and other provisions of the law. (See Ko (2021) for a detailed discussion on the key provisions in the law.)

In this study, we attempt to examine the price dimension of financial intermediation, i.e., whether or not service providers (financial consumers) charge (pay) too much, following the same inquiry posed by Philippon (2015), which is a macro-level financial consumer issue. Nonetheless, there are various micro-level FCP measures that are subject of the recent literature. For example, Cho and Park (2021) lay out three pillars of those micro-level FCP policies - financial education and counseling for consumers, ex ante (or before point of sale, POS) FCP measures in the supply-side, and ex post policy instruments such as conflict resolution mechanisms; And they also discuss specific behavioral patterns in both demand- and supply-side of the financial markets that should be a target of FCP policy regime.[4]

Another relevant trend from Korea to note is that of digital transformation (DT). Unlike the U.S. and several

[3] As to some specifics, the law defines four product types – (1) deposit-type products (e.g., time or demand deposits and installment deposits), (2) loan-type products (e.g., loan instruments, credit card receivables, installed payment products), (3) investment-type products (e.g., securities –stocks and bonds, and financial derivative products), and (4) insurance-type financial products (e.g., life insurance products, and casualty insurance products), and three types of service providers - (1) direct sellers, (2) agents or brokers for selling financial products, and (3) independent financial advisors (IFA) as a new business category.

[4] Those behavioral patterns identified by Cho and Park (2021) include: in the supply-side, pro-cyclical lending and investment (or excessive pursuance of short-term profit by FIs and their employees often at cost of long-term financial loss); credit rationing caused by "Type-A" information asymmetry (i.e., the service providers' being disadvantaged); misrepresentation or incomplete sale caused by "Type-B" info- asymmetry (i.e., financial consumers being disadvantaged); and, and fraudulent intermediation caused by "Type-C" information asymmetry (e.g., cyber theft, voice phishing, and a ponzi scheme); and, in the demand-side, those patterns include overleverage by liquidity-constrained financial consumers; herd behavior or uninformed investment behavior; and, other myopic and uninformed decisions by consumers.

other advanced economies where the ICT-driven innovations in the financial sector started from 1990s and have been showing a more continuous pattern since then, FinTech and other innovative financial services in Korea are more recent (from around 2014) and discrete (with an abrupt and rapid increasing pattern). However, this DT-driven financial innovation appears to be similar in Korea and other countries.

In particular, Cho (2020) summarizes four main social outcomes from this tech-based financial intermediation: first, thanks to the much cheaper, faster, and more convenient intermediation based on an internet or mobile platform, the FinTech service providers have greatly enhanced the efficiency of financial intermediation (IMF (2017), Buchak et al. (2017), Fuster et al. (2018), Frost et al. (2019), Jagtiani and Lemieux (2019), OECD (2019), FSB (2019)); However, the FinTech can also lead to over-leverage for some consumer segments (Chava and Paradkar (2018), and DiMaggio and Yao (2018)); third, as to the financial inclusion, the FinTech service providers tend to serve those borrowers with low credit scores or thin filers (i.e., those consumers with no or low records of financial transaction) more, and their lending activities penetrate those areas with fewer bank branches per capita, as well as those where the local economy is not performing well (Jagtiani and Lemieux (2018) and De Roure et al. (2108)); fourth, the FinTech service providers are shown to be reducing the effect of information asymmetry between borrower and lender by collecting and utilizing various types of soft data for ex ante credit evaluation for financial consumers (Lin et al. (2013), Iyer et al. (2016), Puri et al. (2017), Hildebrand et al. (2017), and Freedman and Jin (2017), Berg et al. (2018)); lastly, those BigTech-affiliated financial service providers can contribute to macroeconomy in two main ways - by imposing competition and contestability to existing financial institutions, and by increasing factor productivities of the firms within a BigTech-driven innovation ecosystem (Citi GPS (2018), and Frost et al. (2019)).

As an initial observation, the DT-driven financial innovations in Korea appear to be already making an impact on the existing FIs. As shown in Table 1 and Figures 2 and 3, the extent of digital transformation in the banking sector is increasing in Korea: that is, while bank branches and ATM per 100,000 people are declining in the last seven years, the mobile or internet accounts are increasing.

Table 1. Indicators of financial inclusion (from the World Bank (2018))

	Indicators of financial inclusion (as of year 2017*)	Korea	Japan	Vietnam	Indonesia	Malaysia	Laos
1	Access to a mobile phone (% age 15+)	96.8	88.5	84.1	76.8	78.7	73.1
2	Access to internet (% age 15+)	83.3	70.0	51.5	32.2	..	25.2
3	Account (% age 15+)	94.9	98.2	30.8	48.9	85.3	29.1
4	ATMs per 100,000 adults (KR ~ '16)	271.9	127.8	24.3	55.6	46.8	26.1
5	Borrowed from FI or used a credit card (% age 15+)	63.2	54.1	21.7	18.4	23.4	8.6
6	Branches per 100,000 adults	15.4	34.0	3.4	16.9	10.1	3.1
7	Debit cards per 1,000 adults (KR ~ '15, ML ~ '15)	3,625.3	na	na	na	1,863.6	na
8	Deposit accounts per 1,000 adults	5,482.6	7,264.0	955.2	1,564.2	2,227.3	634.3
9	Disclosure index (0-5)	3.0	5.0	0.0	4.0	5.0	na
10	Dispute resolution index (0-1)	1.0	1.0	0.0	1.0	1.0	na
11	Financial knowledge score (0-3) (KR ~ '12)	2.0	na	na	na	na	na
12	Made or received digital payments in the past yr (% age 15+)	92.4	95.3	22.7	34.6	70.4	13.3
13	Made payment using a mobile phone or the internet (% age 15+)	67.1	33.3	9.7	7.8	33.9	1.6
14	Received wages or gov't transfers into an account (% age 15+)	61.0	79.8	11.1	14.2	40.3	5.7
15	Saved for old age (% age 15+)	41.8	51.1	18.0	27.4	41.8	27.2
16	Saved for old age (% age 60+)	31.8	54.8	34.7	15.6	30.0	41.7

Source: The World Bank (http://datatopics.worldbank.org/g20fidata/)

*: All indicators are as of year 2017; Exceptions are (4) for Korea ~ 2016, (7) for Korea and Malaysia ~ 2015, (11) for Korea ~ 2012

Figure 2. Indicators of financial inclusion, Korea (2011~17)

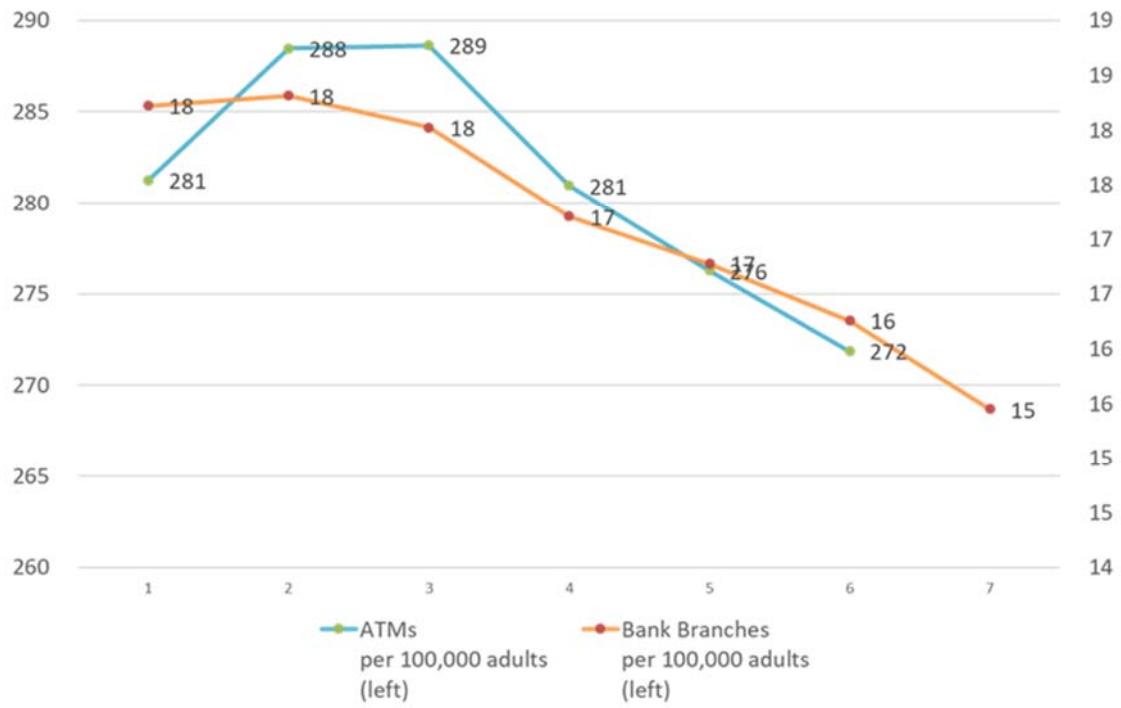
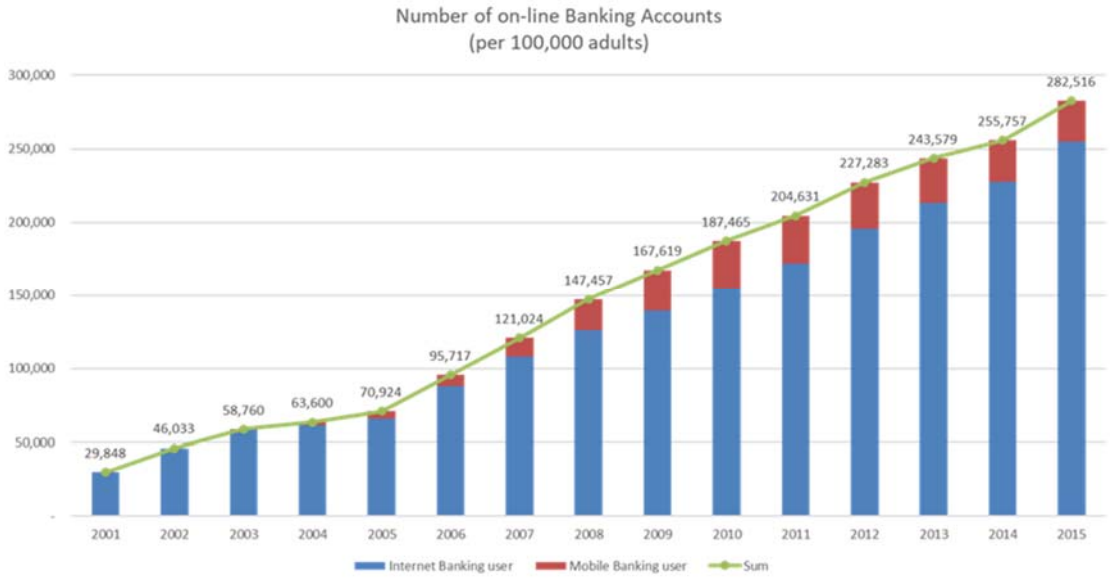


Figure 3. Number of on-line banking accounts, Korea (2011~17)



Note: The number is counted based on registered accounts. One person may have multiple number of accounts, which are counted as separately. Source: Bank of Korea

3. Valuing the Financial Service Sector in Korea: Stock and Flow

Cost of Financial Intermediation

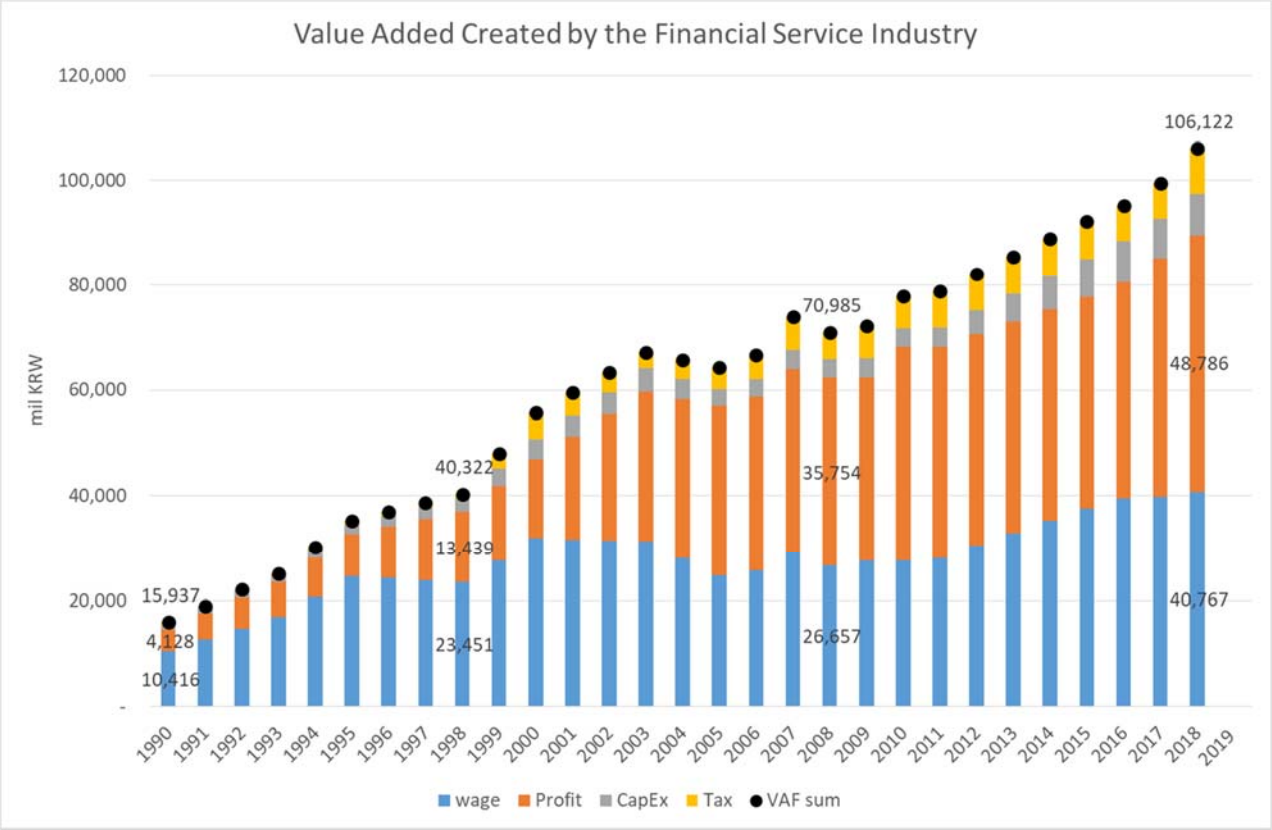
Financial consumers pay user cost of finance for financial services. The total user cost is comprised of return to saver and cost of financial intermediation (Philippon, 2015). The return to saver is the capital cost of financial service industry and the cost of financial intermediation, which is a net value add of financial industry. Conceptually, the cost of financial intermediation is a net cost that a society pays for consuming financial service. The cost of financial intermediation is distributed as a wage, capital expenditures ('Capex' hereafter), and profit (after tax). And thus, from the input point of view, the net value add of financial industry ('VAF' hereafter) is composed of the four components as below:

$$VAF = L + K + Y + T \tag{1}$$

Where, L= labor cost, K = Operating Capex, Y=profit, and T=tax; the 'Operating Capital Expenditures (K)' does not include a return to saver (capital cost for intermediation)

We established the VAF data (from 1990 to 2019) based on the National Account made by the Bank of Korea (BOK). All the monetary values are converted into 2015 price by the Producer Price Index. The result is illustrated as follows:

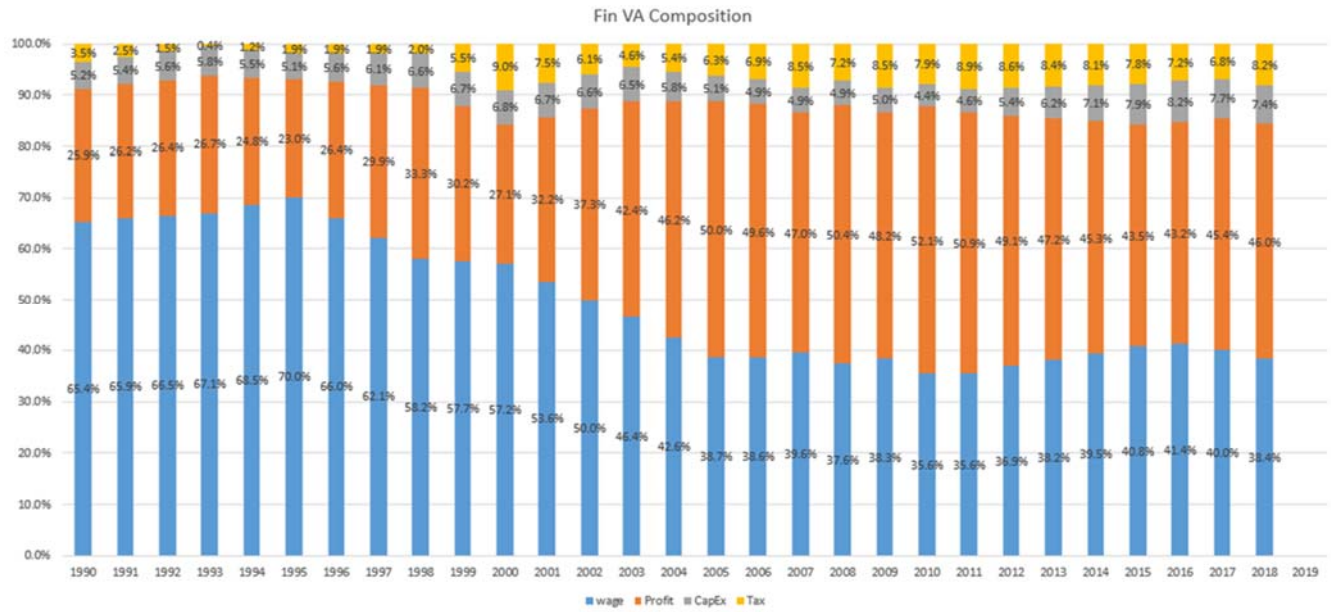
Figure 4. VAF (Value Add of Financial Industry) of Korea (as of 2015 price, in mil KRW)



Source: Korea Statistical Information Service

When decomposed into the four factors, it is observed that the portion of wage (L) has decreased, whereas that of profit (consequentially, along with tax) and operating capital expenditures have increased. The below figure shows a change in composition of the four factors.

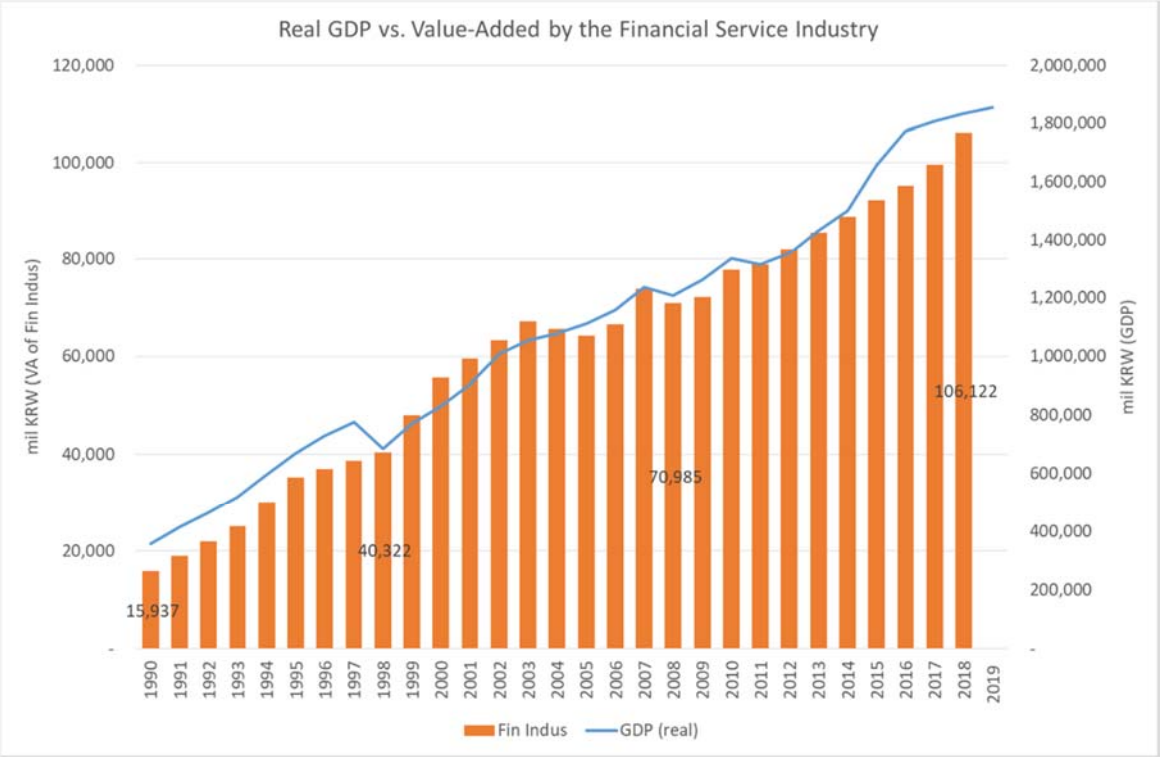
Figure 5. VAF (Value Add of Financial Industry) composition of Korea (%)



Source: Author compilation

We also compared the VAF with GDP. The result shows that VAF has grown up in similar trend with the GDP for 30 years. The below figure illustrates VAF in the left side axis and GDP (measured in 2015 price) in the right axis.

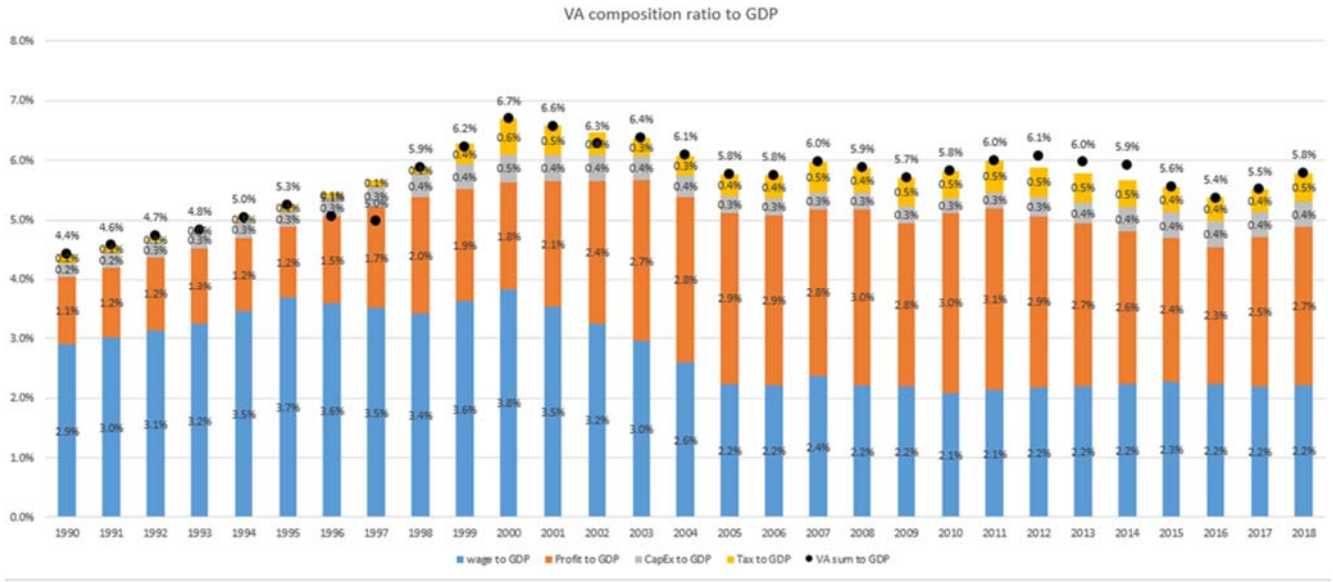
Figure 6. Real GDP & Value-Added by the Financial Service Industry in Korea



Source: Bank of Korea

It is observed that the ratio of VAF to GDP grew up to 6.7% until 2000 and is stabilized thereafter at around 5.7% in average (from 2005 to 2018).

Figure 7. Ratio of VAF to GDP (%)



Source: Author compilation

Intermediated Asset and Unit Cost of Intermediation

The quantity of financial service is measured by the year-end stock of intermediated asset in financial industry. We included total credit created by financial industry and stock market cap. The total amount of created credit is measured by total liquidity (L) minus M_1 monetary supply as below:

$$Intermediated\ Asset = (L - M_1) + S \tag{2}$$

Where, L=total liquidity, M_1= M_1 money supply, S=Stock market cap

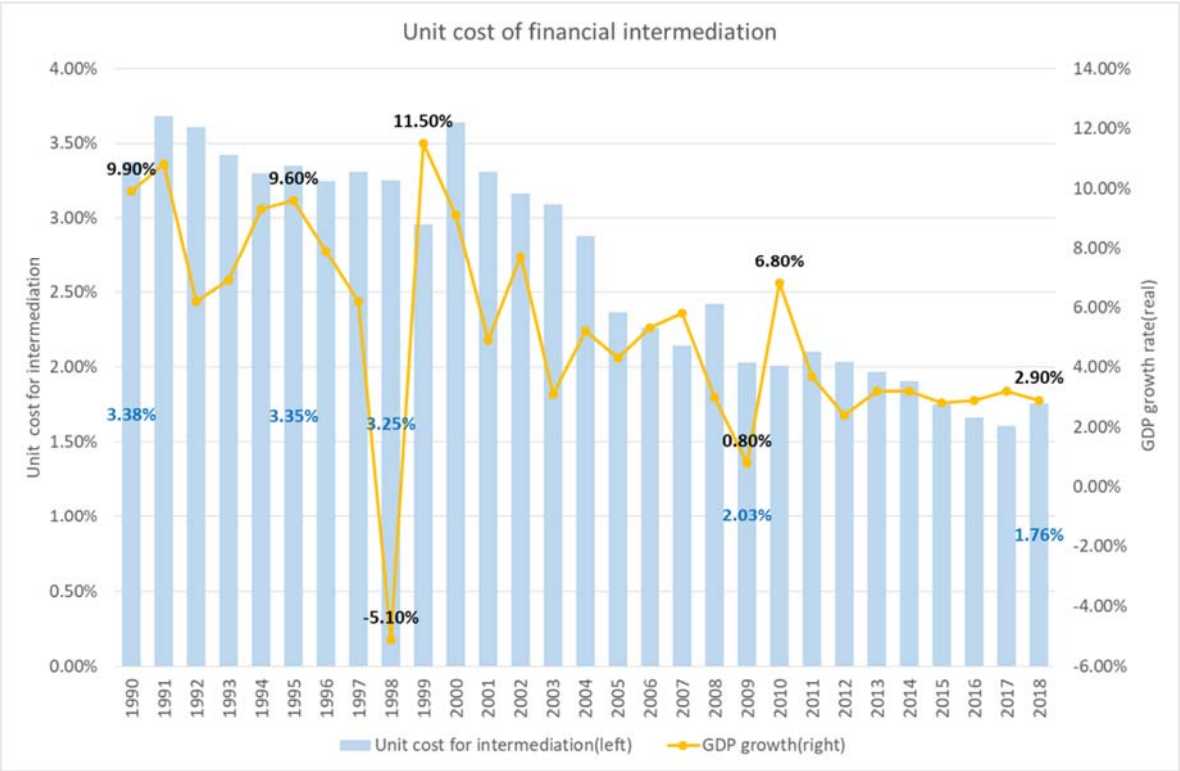
The intermediated asset has increased faster than GDP growth, reaching at 3.52 times to GDP in 2019 from 1.31 times in 1990.

We also established the unit cost of intermediated asset data from 1990 to 2019 by dividing the VAF with the Intermediated Asset. The unit cost of intermediated asset (UCIA) is a consumer's cost for using one unit of intermediated asset.

$$Unit\ Cost\ of\ Intermediated\ Asset\ (UCIA) = \frac{VAF}{Intermediated\ Asset} \tag{3}$$

It has decreased from 3.38% (in 1990) to 1.76% (in 2019), which result is shown as follows:

Figure 8. Unit Cost of Intermediated Asset (%)

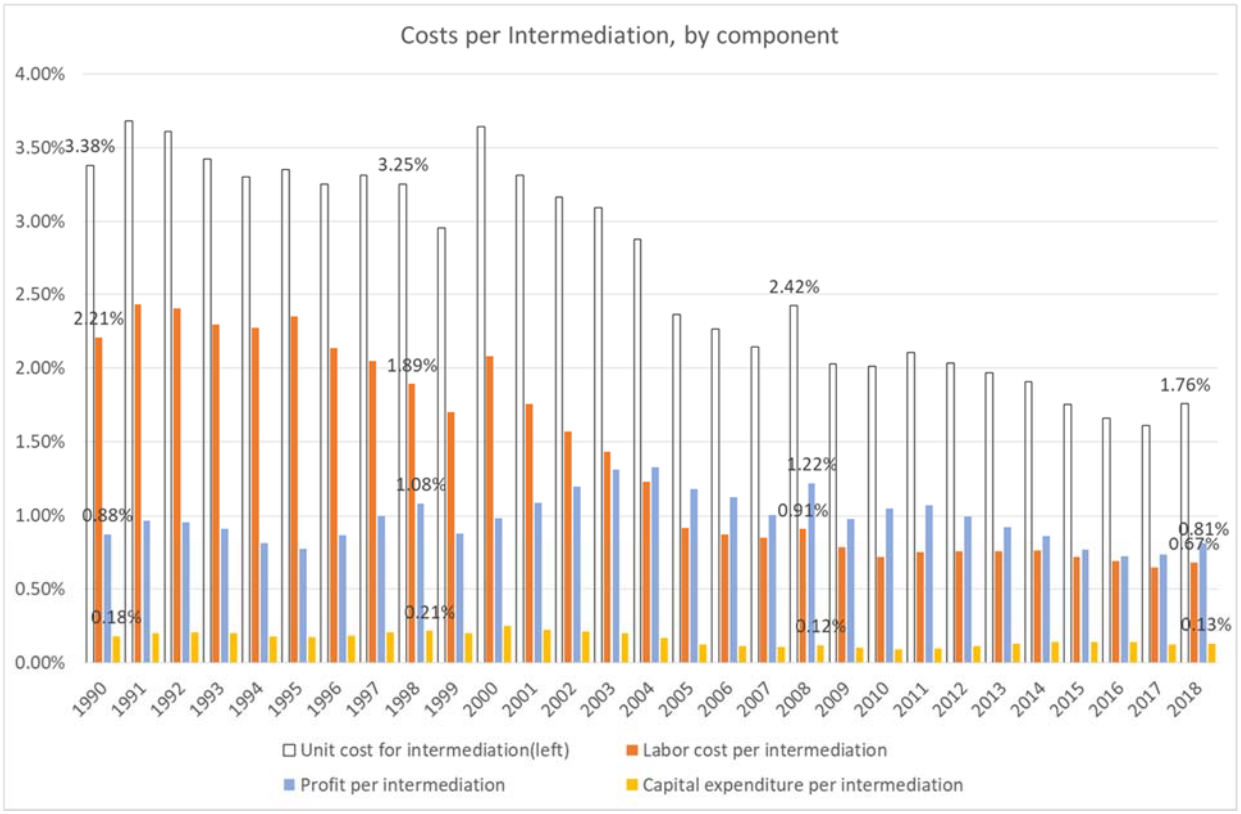


Source: Author compilation

From the analysis of Philippon (2015), the ratio of intermediated asset over GDP in US was around 2.9 ~ 4.1 after 1990, which is higher than that of Korea (1.31 ~ 3.52 times). Whereas the UCIA in US was around 1.8 ~ 2.2% after 1990, which is slightly lower than that of Korea (1.76 ~ 3.38%). And it tends to decline from 1990, which trend is similar in both economies.

We analyzed the portion of UCIA into labor cost (L), Capex(K), and profit (Y). The labor cost per intermediated asset continuously decreased, whereas the profit per intermediated asset stayed around 0.976% in average. It is found that the decrease in financial service cost, measured by UCIA, is mainly due to a decrease in unit cost of labor per intermediated asset from 1990 to 2019. Whereas the profit per intermediated asset was comparatively stable even with some downward shift after 2011.

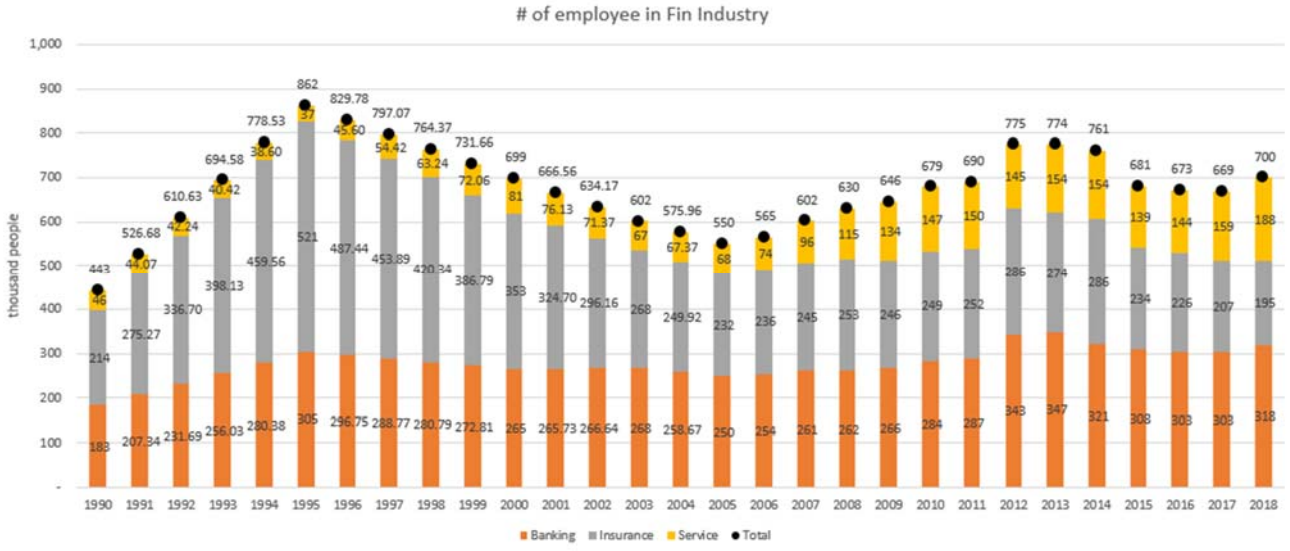
Figure 9. Unit Cost of Intermediated Asset by Components



Source: Author Calculation

We further reviewed the number of employees in financial industry from 1990 to 2018. The data shows no trend but a shape of periodical fluctuation as below:

Figure 10. Total Number of Employee in Finance Industry



Source: Korea Statistical Information Service

However, we can observe that the wage, VAF, and profit per employee have continuously increased. Especially, the intermediated asset per employee has significantly increased from 1.07bil in 1990 to 8.63bil in 2018. These results confirm the continuous decrease in labor cost per intermediated asset as discussed above. And thus, we conclude that the savings in UCIA was mainly caused from the operational efficiency of labor. Additionally, the unit cost of operating Capex per UCIA has decreased even though the portion is small. We will test whether the operational efficiency gains of these two factors are caused from a digital transformation of finance sector in Korea.

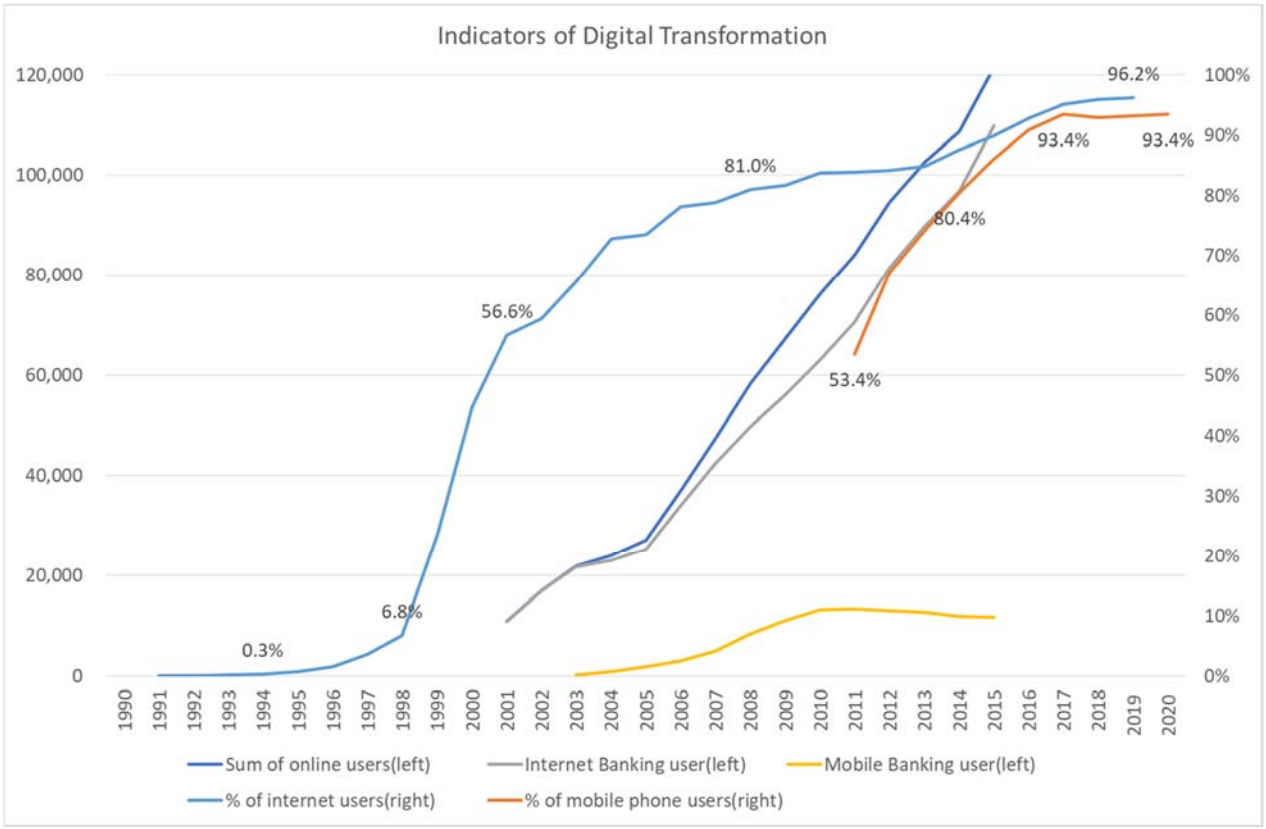
Figure 11. Average Wage, Value Add, and Profit per Employee (in mil KRW)

Source: Korea Statistical Information Service

Digital Transformation in Finance Sector

Before the main test, we reviewed data related with digital transformation in finance sector: internet and mobile banking accounts. Both have increased rapidly from early 2000. We confronted a problem that this data does not exist during enough period for study. So, we had no option but to select percent of internet users as a proxy for internet and online banking accounts to explain a degree of digital transformation in finance industry as they have high degree of correlations: the correlation between internet users and number of internet banking account is 0.8837, and that between internet users and number of mobile banking account is 0.8911.

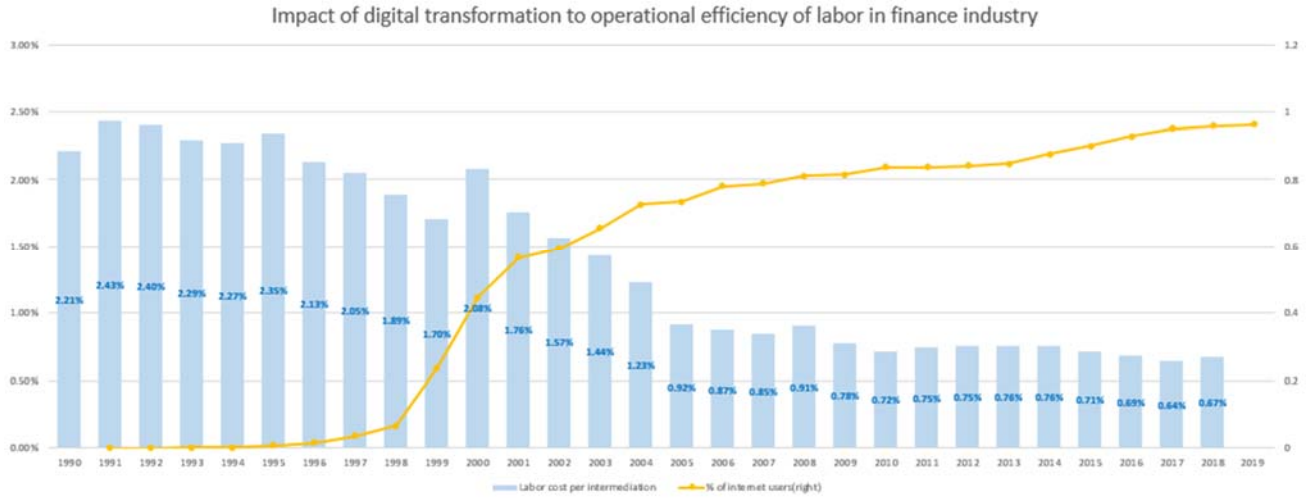
Figure 12. Number Internet Banking accounts and Mobile Banking Accounts (thousands, in left axis), and Percent of Internet Banking Users (%, in right axis)



Source: Korea Statistical Information Service

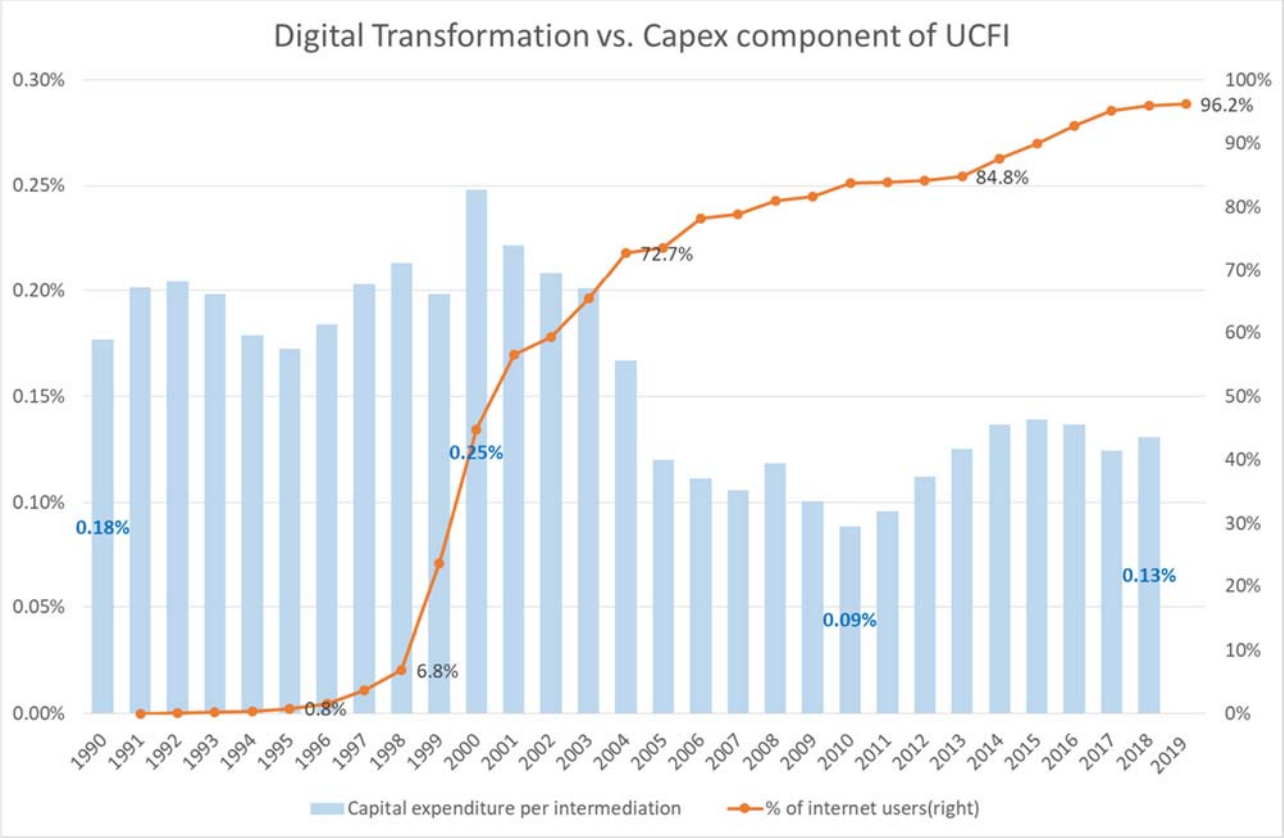
Before the empirical investigation, we overviewed the trends of digital transformation (measured by percent of internet users), comparing with labor cost per intermediated asset, operating Capex per intermediated asset, and UCIA. All of three costs per intermediated asset decreased rapidly from 2000 to 2005, during which period the percent of internet users increased fast as observed from following graphs.

Figure 13. Impact of Digital Transformation to Operation Efficiency of Labor in Finance Industry



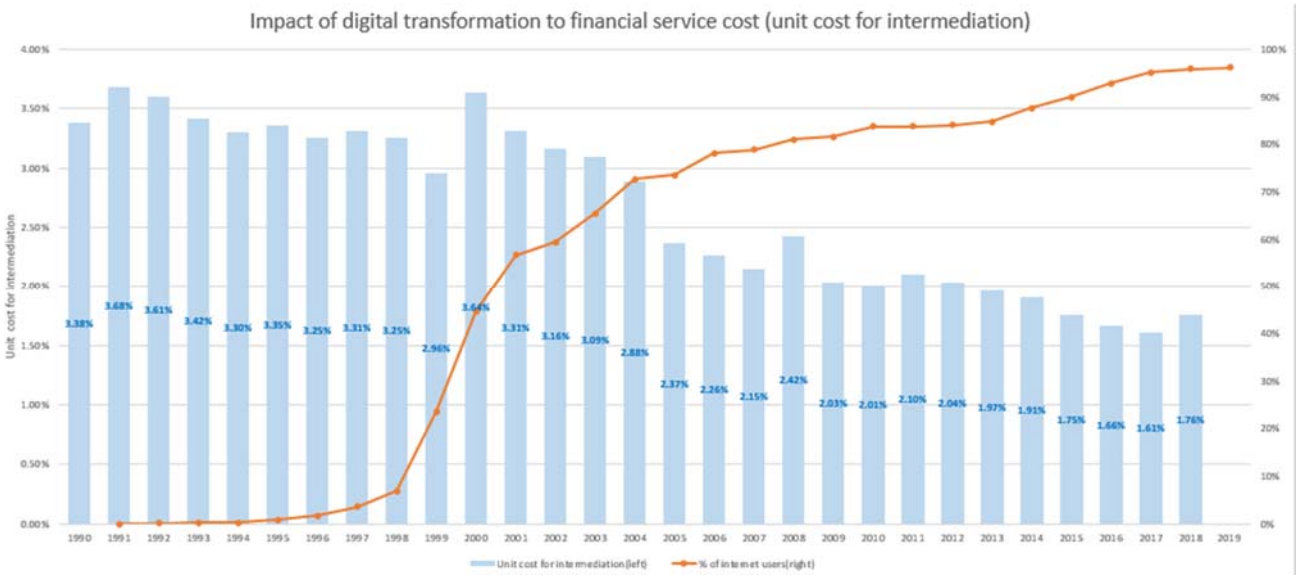
Source: Author Calculation

Figure 14. Impact of Digital Transformation to Operation Efficiency of Asset in Finance Industry



Source: Author Calculation

Figure 15. Impact of Digital Transformation to Financial Consumer Cost



Source: Author Calculation

In the next chapter, we will test whether the digital transformation caused operation efficiency of financial industry either in labor or capital. If it is proved that an efficiency gain was achieved through digital transformation, we will further investigate whether the operational efficiency gain was delivered to financial customers. It means efficiency gain was not exclusively enjoyed by stakeholder as a form of profit.

4. Empirical Test and Result

Testing methodology

Basically, we supposed to use ARDL (Autoregressive Distributed Lag) model for investigating the impact of digital transformation to the financial service and consumer's cost. However, we found out non-stationary distribution issue, which may cause spurious regression, when we performed the Augmented Dickey-Fuller (unit root) test. So, we determined to use ARDL (Autoregressive Distributed Lag) based error correction model (ECM). The ECM is useful as it includes an error correction term and thus allow non-stationary variable (Engle and Granger, 1987; Hassler and Wolters, 2006).

For the purpose of applying the ARDL ECM, we tested the existence of a long run cointegration relationship based on 'Bounds Test' (Pesaran, Shin, and Smith, 2001): the OLS estimators of short-run parameters are asymptotically normal, and the corresponding estimators are consistent if the regressors are I(1) processes, and asymptotically normally distributed regardless of the order of integrations. Pesaran, Shin, and Smith (2001) suggested asymptotic critical values of band from all regressors being purely I(0) to all regressors being purely I(1). Later, Narayan (2005) studied corresponding critical values for various sample sizes including small samples. We selected three variables (UCIA, labor cost per intermediated asset, and Capex per intermediated asset) that showed a long-term cointegration to digital transformation of financial industry, which was measured by a proxy variable of percent of internet users. And the optimal lags of variables are determined based on AIC criteria.

We executed ARDL-ECM (Autoregressive Distributed Lag Error-Correction Model) to investigate the short-run and long-run impact of digital transformation to (Model 1) labor cost for financial service, (Model 2) capital expenditure for financial service, (Model 3) cost for financial service.

$$\Delta y_t = C - (1-\theta)(y_{t-1} - \alpha - \beta x_{t-1}) + \sum_{m=1}^{p} \gamma_m \Delta y_{t-m} + \sum_{n=0}^{q} \delta_{n+1} \Delta x_{t-n} + v_t \qquad (4)$$

Where, Adjustment=$-(1-\theta)$*, Long-term relationship=*β*, Short-term relationship=*δ_{n+1}*, and 0<*θ*<1*

After the modeling, we performed Durbin–Watson and Breusch–Godfrey test to check the serial correlation. And we did White test to check heteroskedasticity issue. The above three models are selected from number of trials to meet assessment criteria. Finally, we checked the stability of our models based on the cumulative sum of squares (CUSUMQ) in residuals (Brown et al., 1974; Stamatiou and Dritsakis, 2014).

(1) Data and Statistics

The below table represents summary of variables, used for the empirical test.

Table 2. Variable Descriptions

Name of variables	Mean	Description	unit
VAF	Value add in finance	Value Add of financial industry* selected from	billion Korea

	industry	national account of Korea	Won
labor	Labor cost	Labor cost among VAF, selected from national account of Korea	billion Korea Won
Profit	Profit	Profit among VAF, selected from national account of Korea	billion Korea Won
capex	Capital expenditure	Capital expenditure among VAF, selected from national account of Korea	billion Korea Won
tax	Tax	Tax among VAF, selected from national account of Korea	billion Korea Won
gdp_growth	GDP growth rate	GDP growth rate of Korea (year to year)	percent
Empl	Number of employees	Thousand number of employees in financial industry of Korea	thousand people
wage	Total wage of financial industry	Total sum of wage in financial industry of Korea	billion Korea Won
Intermedi	Intermediated asset of financial industry	Scale of financial service, measured by the Liquidity Aggregate (L) minus Monetary Base (M_0) plus market cap of stock in Korea	billion Korea Won
Internet	Number of internet banking users	Thousand people of internet banking users in Korea	thousand people
Mobile	Number of mobile banking users	Thousand people of mobile phone banking users in Korea	thousand people
user_internet	Percent of internet users	Percent of internet users in Korea	percent

(*) Financial industry includes banks, stocks, insurance, and other financial service companies.
(Note) All monetary values are converted into 2015 value, based on the Producer's Price Index of Korea.

The below table shows the basic statistics of our data. We made interpolation for missing years.

Table 3. Basic statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
cost_intermedi	29	2.681034	0.712262	1.61	3.64
labor_intermedi	29	1.404138	0.677366	0.644	2.347
capex_intermedi	29	0.1596207	0.047028	0.089	0.248
user_internet	30	54.09333	38.15942	0	96.2
gdp_grow	30	5.183333	3.474745	-5.1	11.5
internetb	15	52792.93	31511.59	10918	109760
wage_empl	29	42.38069	10.62917	23.53	59.53

Test Results

First, we performed the DF-GLS Unit Root test with the four main variables: *user_internet, labor_intermedi, capex_intermedi, and cost_intermedi*. As we expected we confirmed that all the four variables are not stationary as they are time-series data.

Second, we selected candidate variables and formulated ARDL (p, q) models by OLS to obtain the optimal lag orders p and q of equation (4) based on the AIC model selection criteria. And we performed Bounds test, where it is assumed that the model comprises both I(0) and I(1) variables and two levels of critical values are obtained. The procedure is to test joint significance of the lagged levels of the variables. The null hypothesis of no cointegration is rejected if the F-statistic is higher than the critical value of I(0) and I(1) regressors and the t-statistic is smaller than the critical value of I(0) and I(1) regressors. We selected three dependent variables that showed long-term correlation with degree of digital transformation[5] (measured by '*user_internet*').

The selected variables, optimal lag orders, and bound test results for three models are summarized as follows:

Table 4. Lag orders and Result of Bounds test for the Selected Dependent Variables

Model #	dependent variable	independent variable	selected lag orders (p, q)	Bounds Test	
				F-test result	t-test result
1	*labor_intermedi*	*user_internet*	(2,3)	6.507**	-3.314**
2	*capex_intermedi*	*user_internet*	(2,3)	6.233**	-3.522**
3	*cost_intermedi*	*user_internet*	(1,3)	10.050***	-4.444***

*Note: *, **, *** represent significance levels at 10% and 5%, and 1% respectively.*

Once the existence of long-term correlation is checked, we estimated three ARDL EC models. The first model tested the effect of digital transformation (*user_internet*) to the labor efficiency gains (*labor_intermedi*).

[5] We selected the percent of internet users as a proxy measure for the number of internet banking users and number of phone banking users because the latter two variables provide too short period for analysis. The correlation measured between the percent of internet users and the number of internet banking users is 0.883 and that between the percent of internet users and number of phone banking users is 0.891.

Table 5. Model 1 - Impact of Digital Transformation to Labor Cost Efficiency Gains

D.labor_intermedi VARIABLES	Adjustment	Long run	Short run
LD.labor_intermedi			0.614***
			(0.141)
D.user_internet			0.0153***
			(0.00354)
LD.user_internet			-0.00787
			(0.00551)
L2D.user_internet			0.0102*
			(0.00507)
L.labor_intermedi	-0.433***		
	(0.131)		
user_internet		-0.0168***	
		(0.000920)	
Constant			0.933***
			(0.296)
Observations	26	26	26
R-squared	0.747	0.747	0.747

*Note 1. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1*
Note 2. D = first difference operator, L=lagged variable

The error term $(-(1-\theta))$ from the equation (4) determines how quickly the long-term equilibrium is restored, and the estimated result should exist between -1 and 0. As is expected, the coefficient of error (adjustment) term is estimated at (-) 0.433 and statistically significant under 99% confidence level. The coefficient of the long-term relationship *(β)* from equation (4) is estimated at (-) 0.0168 under 99% confidence level. We found that if the percent of internet users increase by 1%p, the labor cost per intermediated asset decrease by 0.0168%p, ceteris paribus. We conclude the digital transformation in finance sector caused operation efficiency of labor, resulting in savings of labor cost per intermediated asset from a long-term perspective in Korea.

The second model tested the effect of digital transformation (*user_internet*) to the operational capital cost efficiency gains (*capex_intermedi*).

Table 6. Model 2 - Impact of Digital Transformation to Operational Capital Cost Efficiency Gains

D.capex_intermedi *VARIABLES*	Adjustment	Long run	Short run
LD.capex_intermedi			0.538***
			(0.159)
D.user_internet			0.00203***
			(0.000702)
LD.user_internet			-0.000755
			(0.000826)
L2D.user_internet			0.00163*
			(0.000805)
L.capex_intermedi	-0.450***		
	(0.128)		
user_internet		-0.000955***	
		(0.000152)	
Constant			0.0852***
			(0.0242)
Observations	26	26	26
R-squared	0.634	0.634	0.634

*Note 1. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1*
Note 2. D = first difference operator, L=lagged variable

The coefficient of adjustment (error) term is estimated at (-) 0.450 and statistically significant under 99% confidence level. The coefficient of the long-term relationship (β) from equation (4) is estimated at (-) 0.000955 under 99% confidence level. The test result shows that if the percent of internet users increase by 1%p, the operational capital expense per intermediated asset decreases by 0.000955%p, ceteris paribus. We conclude the digital transformation in finance sector also enhanced operation efficiency of capital and resulted in savings in operational capital cost per intermediated asset from a long-term perspective in Korea.

The third model tested effect of digital transformation (*user_internet*) to the UCIA (*capex_intermedi*). The UCIA is sum of unit cost of labor, operational capex, and profit per intermediated asset. And it measures the consumer's cost paid for having financial service. We perform this test, separate from the above two, to check whether the operational efficiency gains achieved from the digital transformation ultimately delivered to consumers as a reduced service cost.

Table 7. Model 3 - Impact of Digital Transformation to Financial Service Cost

D.cost_for_intermedi *VARIABLES*	Adjustment	Long run	Short run
D.user_internet			0.0246***
			(0.00616)
LD.user_internet			-0.00157
			(0.00797)
L2D.user_internet			0.0168**
			(0.00744)
L.cost_for_intermedi	-0.498***		
	(0.112)		
user_internet		-0.0180***	
		(0.00131)	
Constant			1.643***
			(0.383)
Observations	26	26	26
R-squared	0.624	0.624	0.624

*Note 1. Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1*

Note 2. D = first difference operator, L=lagged variable

The coefficient of adjustment (error) term is estimated at (-) 0.498 and statistically significant under 99% confidence level. The coefficient of the long-term relationship *(β)* from equation (4) is estimated at (-) 0.018 under 99% confidence level. The test result shows that if the percent of internet users increase by 1%p, the unit cost of intermediated asset decreases by 0.018%p, ceteris paribus. We conclude the digital transformation in finance sector ultimately resulted in decrease in the unit cost of financial service per intermediated asset from a long-term point of view in Korea. From the equation (1) and (3), the UCIA can be rephrased as below:

$$UCIA = \frac{L}{Intermediated\ Asset} + \frac{K}{Intermediated\ Asset} + \frac{P+T}{Intermediated\ Asset} \quad (5)$$

From the above two test results, the long-term cost efficiency gains of labor ($\frac{L}{Intermediated\ Asset}$) was measured as 0.0168%p and that of capital expenditure ($\frac{K}{Intermediated\ Asset}$) was measured as 0.000955%p respectively. The sum of these two estimations makes 0.01775%p, which is close to the third test result of 0.018%p. With the equation (5) and the three test results, we conclude that the operational efficiency gains in both labor and operational assets, achieved from the digital transformation, are ultimately delivered to consumers as a reduced service cost in Korea. Another important consideration is the role of profit (before tax) per intermediated asset. The above result was partly due to the comparative stable level of profit (before tax) per intermediated asset, which shared 0.000245%p of comparatively small portion of efficiency gains.

We checked the existence of serial correlation issue through Durbin–Watson and Breusch–Godfrey test with three models. We also performed White's test to check heteroskedasticity issue. The results suggest three models do not have serial autocorrelation or heteroskedasticity issue as summarized in below table:

Table 8. Diagnostic Test Results

Tests	Model 1		Model 2		Model 3	
	Test value	Decision	Test value	Decision	Test value	Decision
Durbin-Watson (d-statistic)	1.9073	No autocorrelation	1.997	No autocorrelation	1.8520	No autocorrelation
Breusch-Godfrey LM test (Prob>chi2)	0.9072	No serial correlation	0.7529	No serial correlation	0.3095	No serial correlation
White test (Prob>chi2)	0.4076	No heteroskedasticity	0.4070	No heteroskedasticity	0.6799	No heteroskedasticity

Lastly, once the three ARDL-ECM have been determined, the cumulative sum of squares (CUSUMQ) in recursive residuals is plotted to assess parameter stability (Brown et al., 1974; Stamatiou and Dritsakis, 2014). All the three models are proved to be stable within 5% of upper and lower bounds. The results are illustrated as follows:

Figure 16-a. CUSUMQ for Model 1

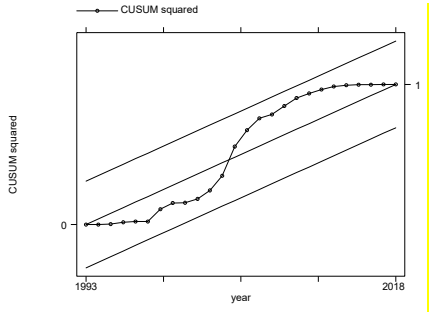


Figure 16-a. CUSUMQ for Model 2

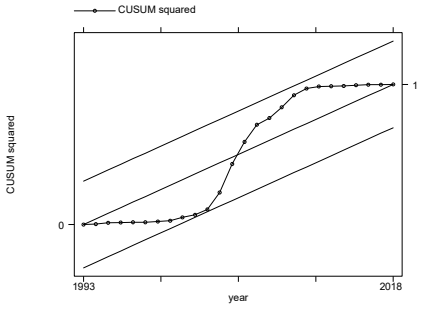
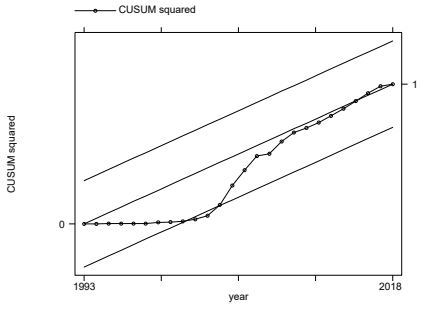


Figure 16-a. CUSUMQ for Model 3



Summary:

The long-term impact to financial service is estimated at 0.018%p decrease, which is similar to the sum of savings in labor cost and capital expenditure. The cost for financial service is comprised of labor cost, capital expenditure, profit, and tax. It is estimated that the digital transformation saved 0.0169%p of labor cost, and 0.000955%p of capital expenditure (both measured as a ratio to unit cost for intermediation). The cost for financial service also follows the trend of GDP growth of Korea. However, we checked that profit of financial

industry, measured to financial mediation, did not have long-term relation with digital transformation.

From the above summary of test result, we conclude that digital transformation caused consumer's benefit mainly by achieving operation efficiency of labor from the late 1990's to 2000's in Korea. Actually, the total number of employees in financial industry fluctuated during our analysis window, and the wage per employee has constantly increased. However, the amount of intermediation (quantity of financial service) per employee increased much higher than the increase in salary per person, resulting in decrease in labor cost per intermediation.

However, this paper has several limitations. First, a change in financial products might affect to the change of UCIA in Korea during our test period (from 1990 to 2019) along with the efficiency gains through digital transformation. Especially, house mortgage loans might have enhanced operation efficiency because they are standardized financial products with growing size of market. And that, home mortgage loans could have a lower realized loss from default because they secure real estates as a mortgage. Which factors could contribute to the reduced operation cost. Second, the number of time-series data was not enough in our research. Also, we had no other option than interpolate the missing years due to lack of time-series data. Improvements in further study is expected when detailed composition of loan data as well as extended time-series data span are reserved.

5. The Vietnamese Case: FCP policies in an emerging market context

Economic growth and financial sector development

Since the promulgation of the opening policy in 1986, referred to as "Doi Moi," to create a socialist-oriented market economy, the output of the Vietnamese economy has steadily grown, maintaining the steady real GDP growth rates of 6~7% per annum between 2012~19. (See Dinh et al. (2021) for more details, which is submitted as Attachment to the KDIS research project.) The quality of growth and the business investment environment are also improving, as evidenced by the rise of newly established enterprises in number and by the declining unemployment rate in the recent years.

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Figure 17. Vietnam Economic growth (%,yoy), 2012-2019

Source: Dinh et al. (2021)

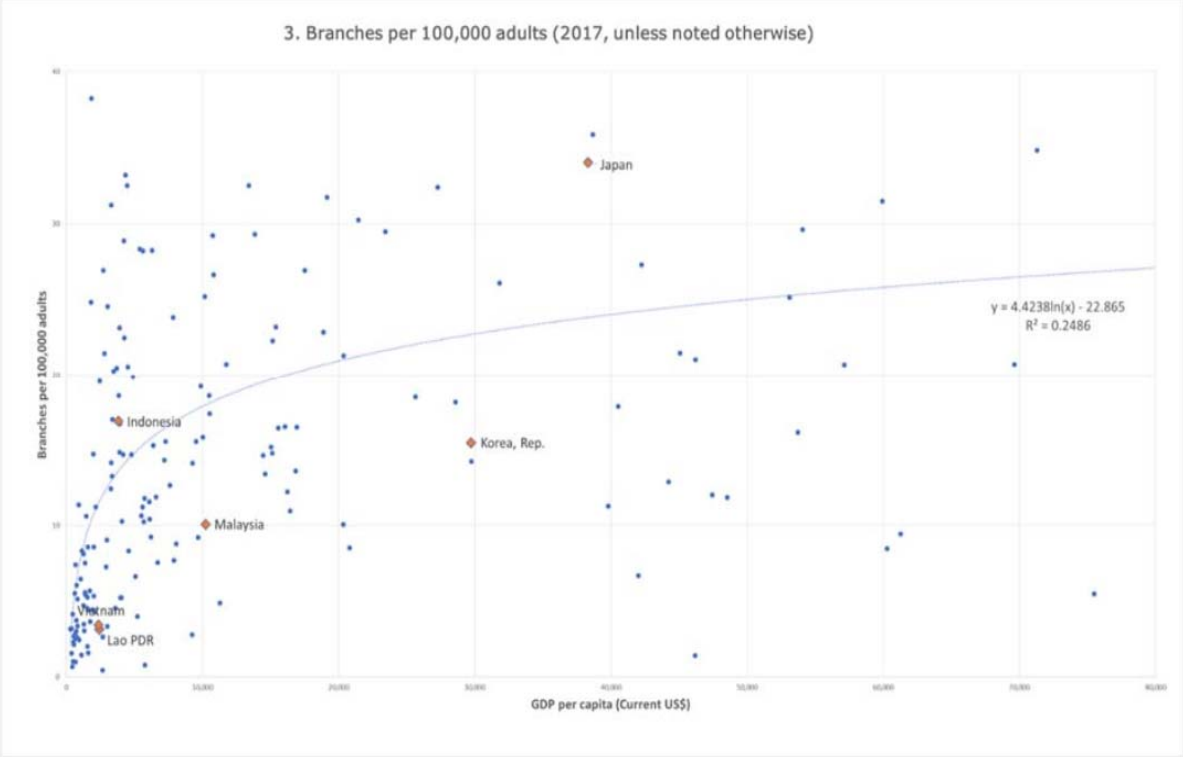
Since the Vietnamese financial system is currently a bank-oriented system and is less diversified in product offering to financial consumers compared to the developed economies. The total asset held in the banking sector amounts to 165% of GDP in 2014, and accounts for nearly 95% of the total assets of the financial system. The banking system is the main channel of capital mobilization, contributing to the growth of social investment and economic growth. As a consequence, the corporate bond market is less developed, which currently focuses on two particular products issued by SOEs or credit institutions. Most of the domestic enterprises are not yet qualified for the issuance requirements, especially in aspects such as weak governance, transparent information disclosure, which makes it difficult to gain the confidence of investors. In addition, the country has not yet established a credit rating agency, neither for business entities nor for consumers, and the decree on the establishment and operation of such agency is currently in the process of collecting opinions. The market interest rates have been fairly high with 10~15 percent APR until 2014, higher than its ASEAN neighbors, which, however been declining since then (to a 7~8 percent range).

Table 9. Lending interest rate in ASEAN area

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Indonesia	14,1	16,0	13,9	13,6	14,5	13,3	12,4	11,8	11,7	12,6	12,7	11,9
Malaysia	6,0	6,5	6,4	6,1	5,1	5,0	4,9	4,8	4,6	4,6	4,6	4,5
Myanmar	15,0	16,1	17,0	17,0	17,0	17,0	16,3	13,0	13,0	13,0	13,0	13,0
Philippines	10,2	9,8	8,7	8,8	8,6	7,7	6,7	5,7	5,8	5,5	5,6	5,6
Singapore	5,3	5,3	5,3	5,4	5,4	5,4	5,4	5,4	5,4	5,4	5,4	5,4
Thailand	5,8	7,4	7,1	7,0	56,0	5,9	6,9	7,1	7,0	6,8	6,6	6,3
Vietnam	**11,0**	**11,2**	**11,2**	**15,8**	**10,1**	**13,1**	**17,0**	**13,5**	**10,4**	**8,7**	**7,1**	**7,0**

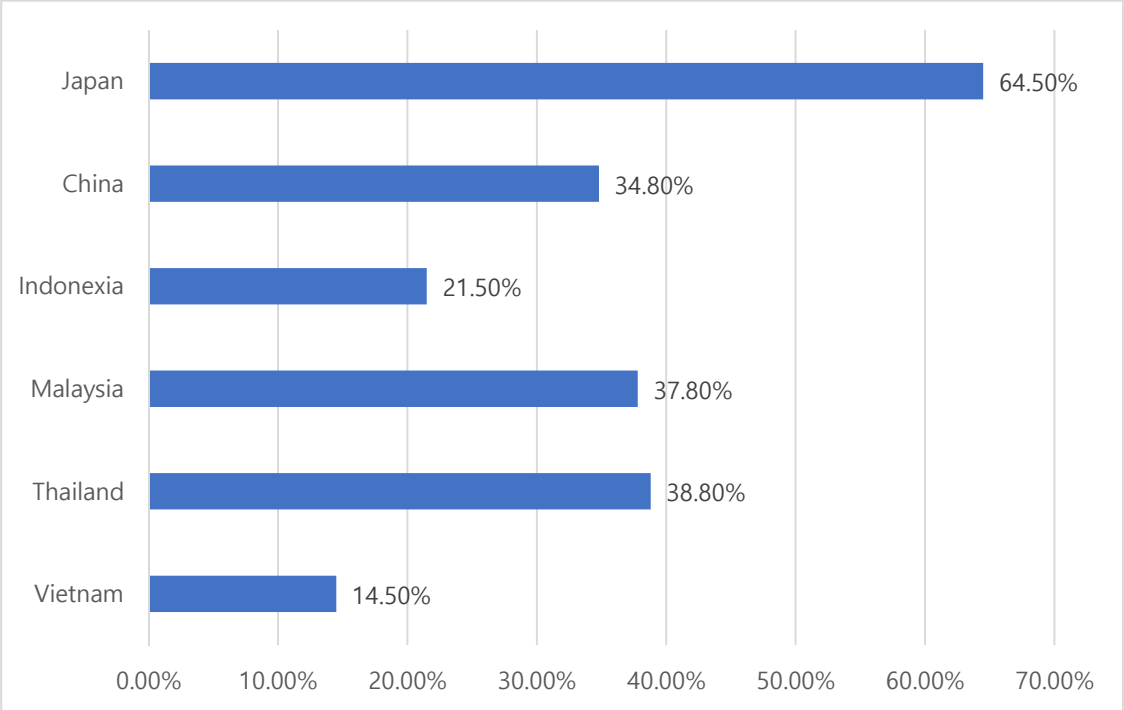
As to financial inclusion, Vietnam generally lags its neighbors in terms of the indicators thereof. For example, number of bank branches and that of ATMs per 100,000 adult population in Vietnam are 3.4 and 24.7 in 2017, respectively (in comparison, those in Korea are 15.4 and 271.9), which are generally increasing as per capita GDP goes up. However, those figures in Vietnam are behind such countries as Indonesia and Malaysia as well. In response, the banks are currently actively investing in the ATM and other efficient POS systems, and they also attempt to expand the alternative payment channels such as internet- and mobile-based ones.

Figure 18. Bank Branches per 100,000 adults (2017)



As a demand-side indicator, only 14.5% of adult population in Vietnam have savings account at financial institutions, which is lower than other Asian countries (64% in Japan, 38% in Thailand, 37% in Malaysia, 34% in China, and 21% in Indonesia). In addition, according to the recent surveys on financial literacy done by OECD and ADBI show that the Vietnam's financial literacy index is the lowest (11.6%) compared to selected countries in the region and in the world. (Morgan and Long (2017), and OECD (2015)) The poor financial literacy means that people are less likely to choose more efficient options for their financial services and more likely to fall into the trap of usury or engage in illegal fundraising activities. Hence, the government, the Ministry of Education and Training in particular, is currently collaborating with international organizations such as the World Bank to set up a financial literacy network run by the National Economy University and National University, e.g., having launched the financial education program in 2018 under the Citizen Education Curriculum for all grades from primary to high schools. However, the financial education program for adults is still in its infant stage, with some experimental programs being pursued.

Figure 19. Adults with savings account at financial institutions (as of 2017; %)



Source: Dinh et al. (2021)

The DT and FCP trends in Vietnam

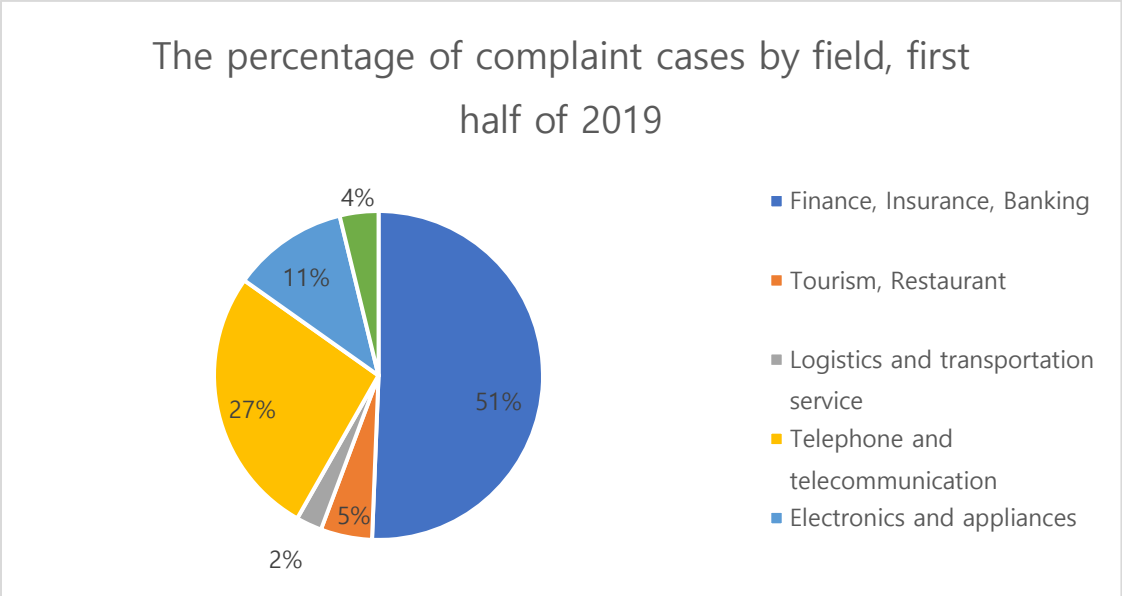
Like in most other countries, the Fintech sector in Vietnam shows a solid and rapid growth pattern in recent years. This is a welcoming trend given that a big portion of adult population (about 40 percent) does not have an access to banking service and that the trend opens up new opportunities with online financial services to many. In particular, the Vietnam's FinTech sector reached USD 4.4 billion in transaction value in 2017, and is expected to grow to USD 7.8 billion in 2020. (Linh San (2018)) In 2019, investment in Fintech in Vietnam accounted for 36% of total investment in this sector across ASEAN, while in 2018 this figure was only 0.4%.

The number of Fintech companies participating in providing services in Vietnam market has more than doubled from approximately 40 by the end of 2016 to more than 150, spread across many different fields (see Appendix), and the sector has been attracting the attention of many technology experts, finance and investors around the world.

The most popular FinTech segment in Vietnam is the mobile payment service, with 35 startups. (See Appendix for details.) P2P lending also represents a growing segment by offering a wide range of products and services for various loan purposes to financial customers, including individuals as well as SMEs who could not access to official capital market or to the banks. In terms of crowdfunding, there are four common types in Vietnam – (1) Donate, (2) Reward-based, (3) Equity-based, and (4) Lending, among which the first one is fairly familiar form of capital-raising among Vietnamese people (e.g., Charity Map, FirstStep, and Comicola). In terms of institutional setting, the country does not currently have a specific legal framework for P2P lending and other FinTech segments.

In terms of the FCP policy, despite the fact that Vietnam is one of the first nations among ASEAN countries that issues the Law on Consumer Protection (2010), there has not been any specific policy or law yet to protect financial consumers, who are still not differentiated from other consumer groups. Hence, financial consumers are mainly protected by national laws, with the same regulations as other consumer groups (i.e., by the Consumer Protection Law), which should receive a proper policy attention going forward. To that issue, the Department of Competition and Consumer Protection (2019) states that the consumer protection act in Vietnam is facing many difficulties, of which the implementation and enforcement of laws to protect consumer rights have not been properly focused by the authorities; The responsibilities of government sectors in terms of consumer protection have not been clearly defined. Besides, the provisions of the Law on the Protection of Consumer Rights and many other relevant legal documents have not yet implemented effectively, and have not possessed strong enough sanctions to prevent, penalize and compensate consumers correspondingly. (Dinh et al. (2021))

Figure 20. Breakdown of consumer complaints in Vietnam



One particular area of financial consumer protection is the safety in using private data. In many financial transactions, especially consumer credit transactions, installment loans, it is reported that the consumers are not properly informed or explained by the service providers, and that the financial companies give private information to third parties in such activities as debt collection. Many consumers also complain that, before using the service, they were not informed about sharing some information on their (e.g. photos, contacts on mobile phones) by the service provider, which violates the existing law and regulations. In recent years, the issue of consumer information protection, often called information policy, has been actively implemented by business entities, mainly through the development of internal policies on consumer information management (e.g., publishing publicly on the website, and leaflets on information policies provided to consumers). However, there are still a large number of enterprises that have not grasped the legal provisions on the protection of consumer information, resulting in no policies or appropriate behaviors when implementing transactions that generate information exchange with consumers.

Table 10. Information leakages in Vietnam

The year	Cases	Impact
Up to 2020		50 million users have been leaked (including their personal phone numbers and Gmail accounts)
The first half of 2019	6219 cyber attacks	Including 2155 phishing, 3824 deface and 240 malware attacks.
The first half of 2018	1039 cases	2.39 billion accounts were leaked (including their personal information, social insurance numbers, credit card numbers and many additional information)
In the end of 2017		1.4 billion accounts and users were leaked from social medias and online services (up to 41GB data, including 437644 email accounts, 930 of which were emails email of state agencies)
In average		100,000 computers in Vietnam are infected with malicious virus everyday.

Source: Vietnam Computer Emergency Response Team (VNCERT) (2019)

Table 11. Key regulators and supervisors for FCP

Agency	Key Mandate	Main Law	Institutions Supervised
State Bank of Vietnam Relevant internal unit: Banking Supervisory Authority (BSA)	To regulate and supervise formal credit institutions	Credit Institution Law	- Banks (except VBSP) - Finance Companies -PCFs - MFIs
Ministry of Finance Relevant internal unit: Insurance Supervisory Authority (ISA)	To regulate and supervise all insurance companies	Law on Insurance	Insurance Companies
Ministry of Industry and Trade Relevant internal	To regulate and enforce consumer protection	Consumer Protection Law	Across all sectors

unit: Vietnam Competition Authority (VCA)	across sectors		

Source: IFC (2014)

6. Conclusion

This study aims to empirically investigate the inter-linkages between the two on-going global trends – the digital transformation in the financial service sector and the policy initiatives to protect financial consumers, by utilizing a set of indicators of the aggregate outcomes of the financial service sector in Korea. As the main findings, we report that: Over time, the unit cost for financial intermediation in the country tends to move in tandem with the growth of economic output, although the profit portion of the cost did not exhibit a long-term relationship with the GDP trend; The long-term effect of the DT trend is negative (i.e., cost-saving) for labor input and capital expenditure, which are shown to be statistically significant, and, as a consequence, its impact on the total intermediation cost is also positive and statistically significant.

The main implication of our empirical findings is that, while the recent literature documents a high and rising cost of financial intermediation in the U.S. and other countries, the financial service in Korea is seemingly different from those countries in that we do not find the evidence that the cost of intermediation in the country is excessive (in comparison with those countries as well as over time within the country). In addition, the on-going trend of digital transformation appears to be working as a driver of efficiency gain in the whole financial service sector. In a viewpoint of financial consumers, these outcomes should be viewed as positive because the price of the service is not overly expensive and the data and ICT driven innovations in the sector are also working in their favor. A similar macro-level empirical study, along with compilation of the aggregate indicators used, can be extended to other countries, such that an inter-country comparison can be done based on those macro-level FCP measures.

Nonetheless, how well a country institutes a FCP policy regime should be assessed not only in terms of the macro-level (or aggregate) outcomes of the financial service sector but also in terms of various micro-level (or institutional) attributes of the policy regime adopted. And socio-economic conditions as well as the financial market characteristics tend to widely vary across different countries, as shown in the discussion of the Vietnamese case in the above. In that sense, it is important to compile those institutional attributes related to FCP, in particular, those indicators for the three pillars of FCP as elaborated by Cho and Park (2021) – financial education and other means to enhance consumers' financial literacy and wellbeing, those self-regulation and other ex ante (or before point-of-sale) requirements to ensure fair and ethical treatment of financial consumers, and the ombudsman and other ex post mechanisms to resolve disputes between consumers and FIs efficiently and affordably.

In particular, there are two important considerations to be reflected in a sound comparison of the FCP policy regimes: first, the those FCP measures should also target specific behavioral patterns in both demand-side and supply-side of the financial markets, e.g., taming pro-cyclical lending, reducing anomalies caused by

information asymmetries of different sort, protecting voice phishing and other illegal transaction, and so on; and, the implementation phase of those policy instruments should also be considered because a country can have a comprehensive set of policy measures in place but can have a poor enforcement and implementation. We will leave such solid inter-country comparison with respect to those micro and macro FCP indicators as topic for future research.

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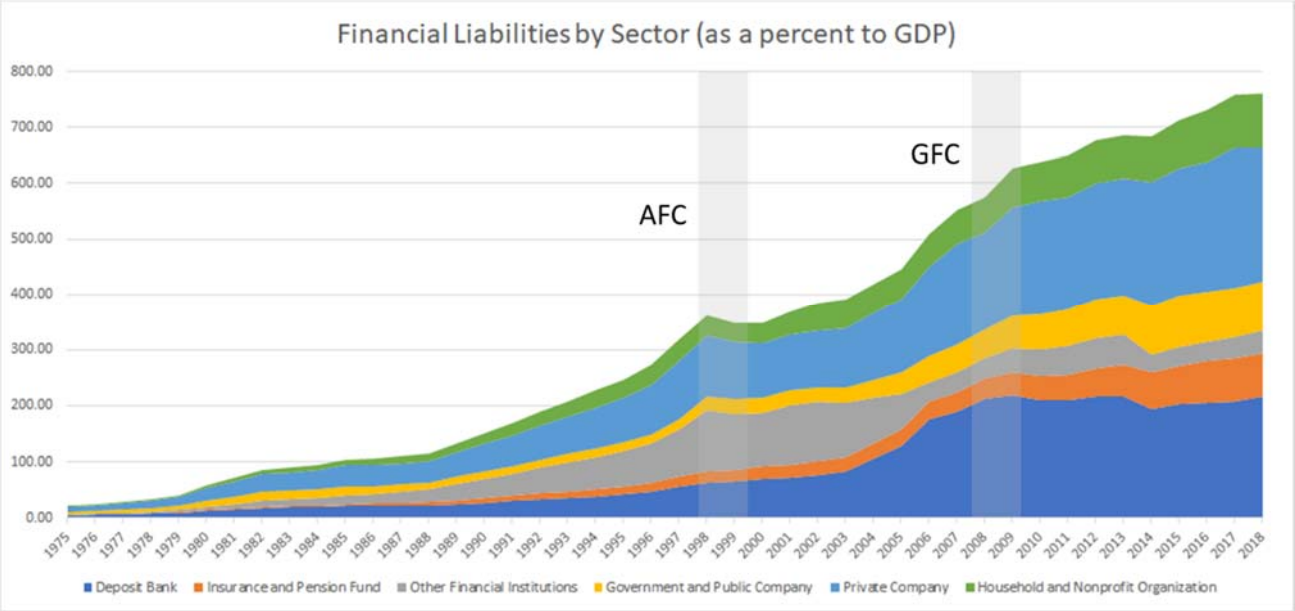
Appendix 1. Evolution of the financial sector in Korea

Figure A.1.1. Sizing the financial service sectors in Korea (% of liability to GDP)



Data source: Bank of Korea

As shown in Figure 3 below, the size of the financial service sector (as a whole) in Korea, measured in terms of the total and sectoral liabilities, has grown over time both in absolute and relative terms as the national economy grows: the total amount of liability in the economy as a percent to GDP (by consumers as well as by other economic agents) increased from 26% in 1975 to 761% in 2018, roughly a 35-times increase during the last 40 some years; different sectors exhibit different processes over time, although they show similar boom-bust patterns right before and after each of the two pronounced financial crises – the Asian Financial Crisis (AFC) in 1998~1999 and the Global Financial Crisis (GFC) in 2007~2009; and, the total market cap in the stock markets also show a similar steady growth over time (Appendix 1). In this project, we will focus on three particular consumer finance sectors – consumer lending (the green section in Figure 3), insurance service (the orange section), and investment (Appendix 1). In addition to the sizing indicators, references and data on the composition of each sub-sector, for both formal and informal service providers, will also be collected and compared.

Figure A.1.2. Interest rate trends in Korea

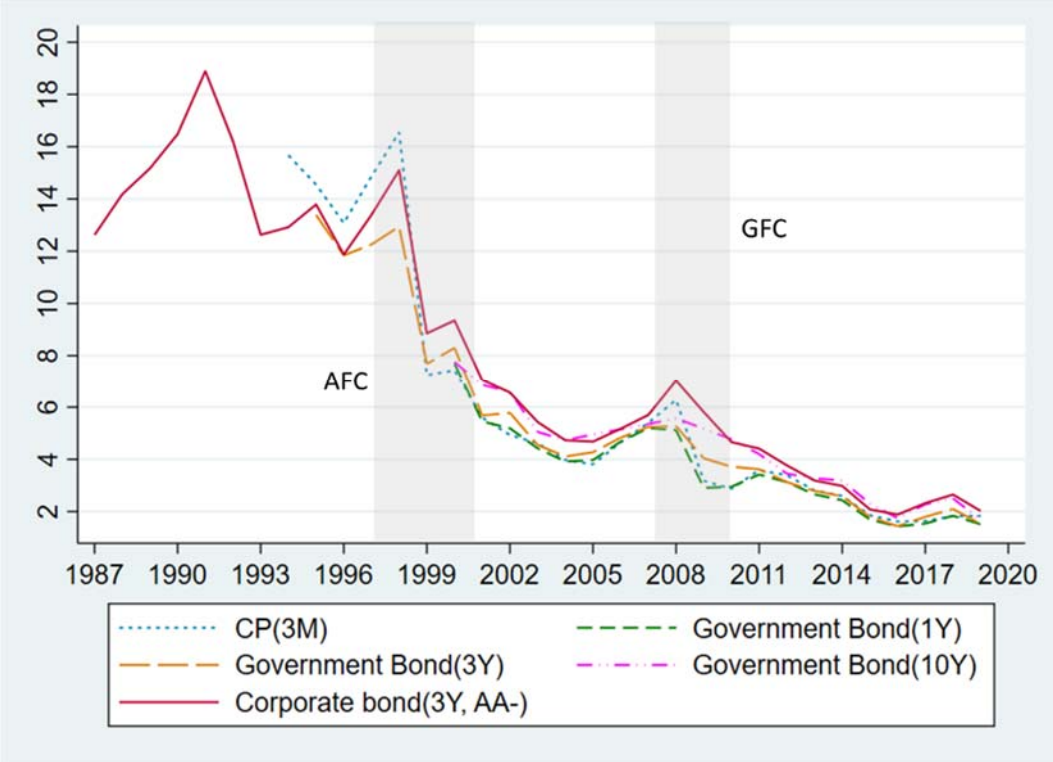
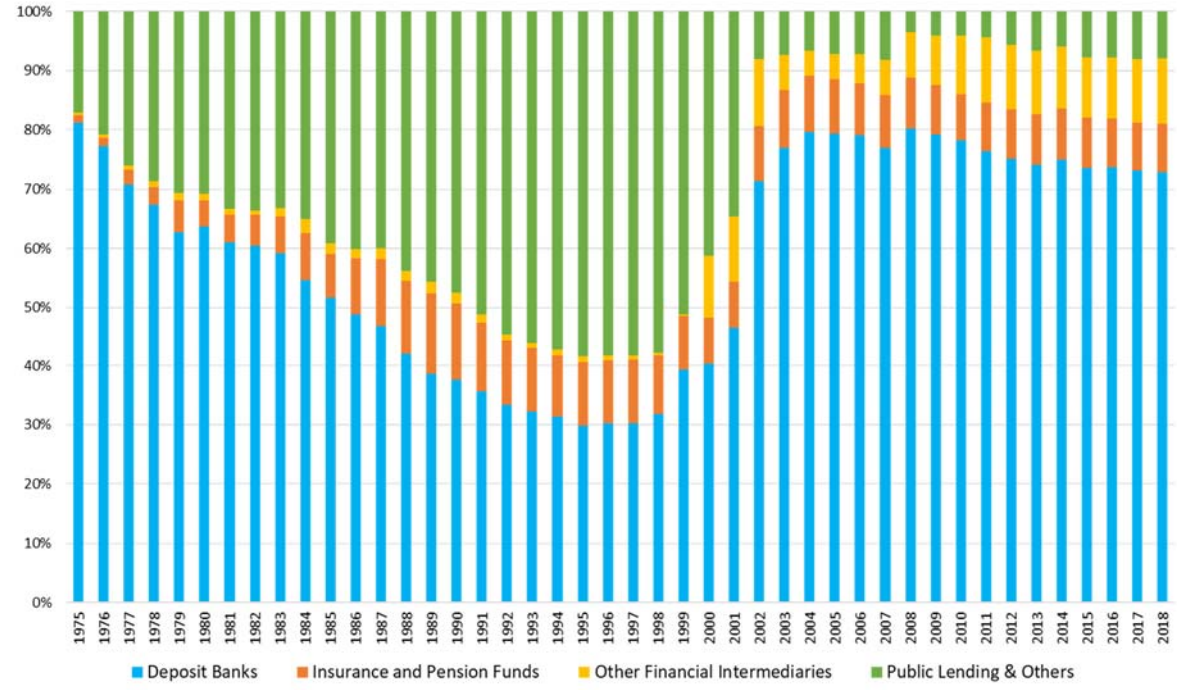


Figure A.1.3. Household lending sector, by the lenders (1975~2018)



Data source: Bank of Korea

Figure A.1.4. Trends of the total market cap in the stock markets (KOSPI & KOSDAQ, 1995~2018)

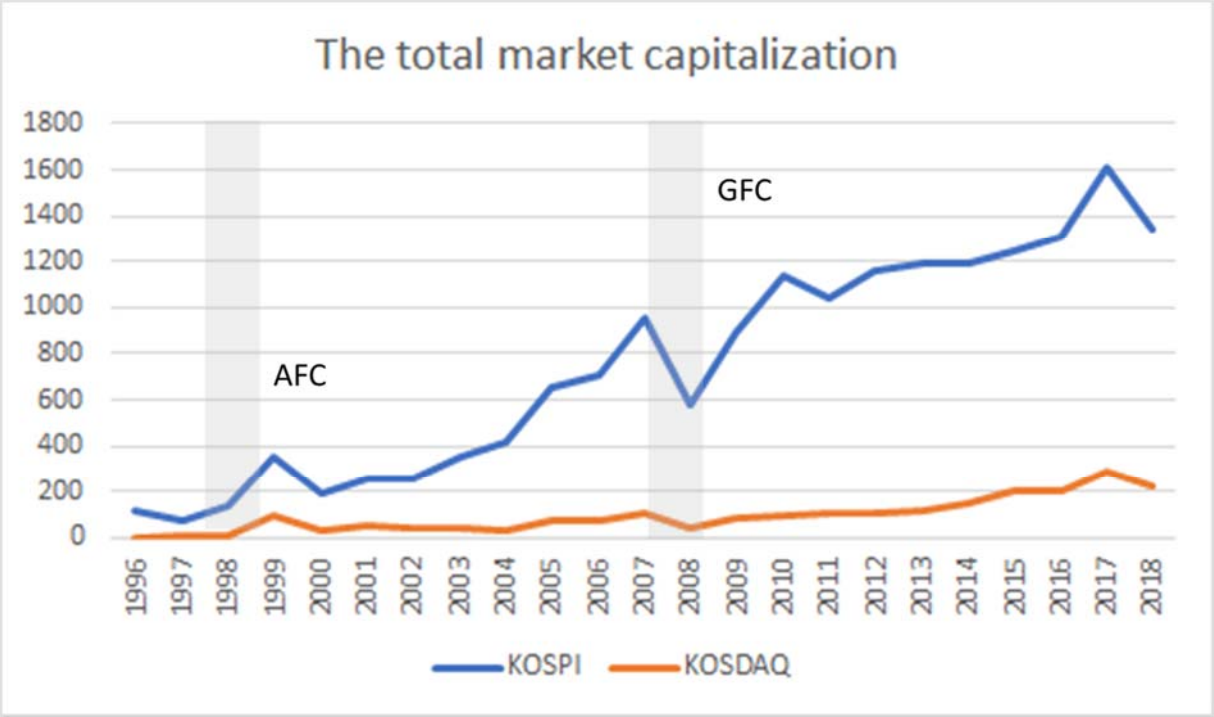


Figure A.1.5.

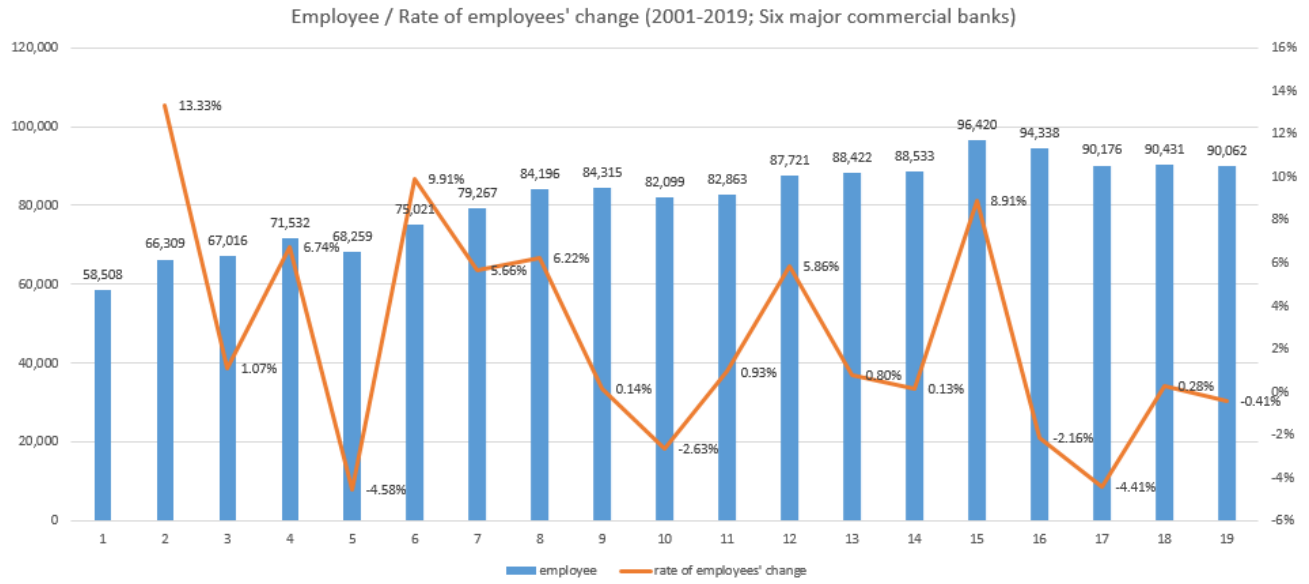
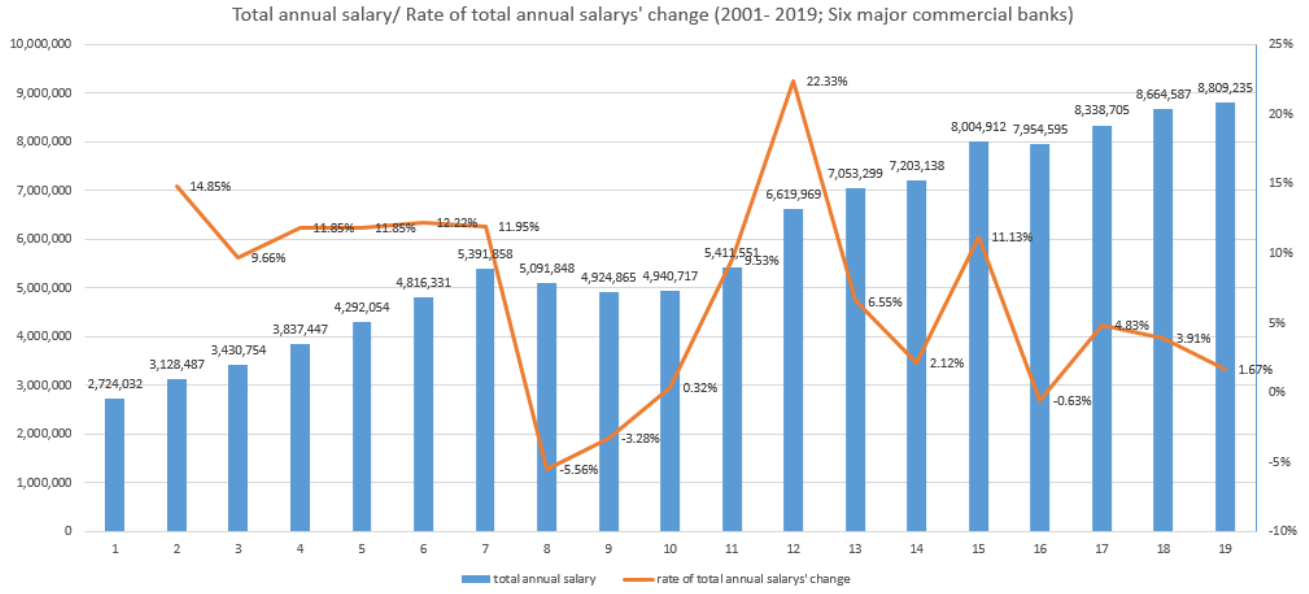


Figure A.1.6.



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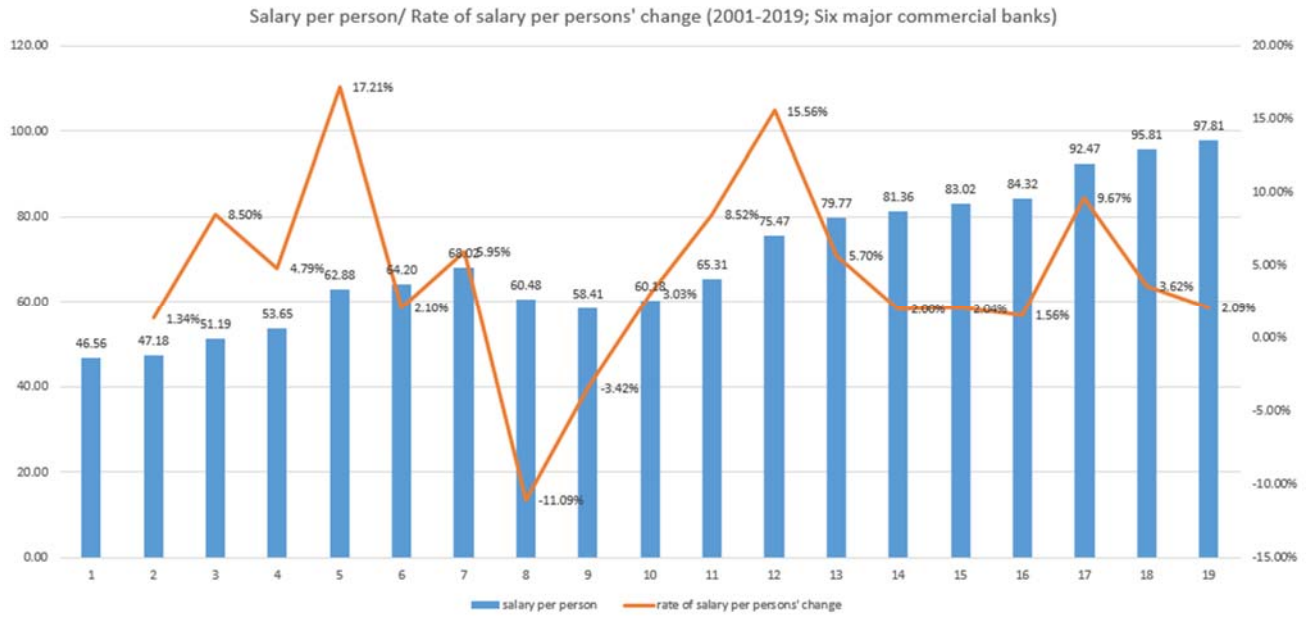
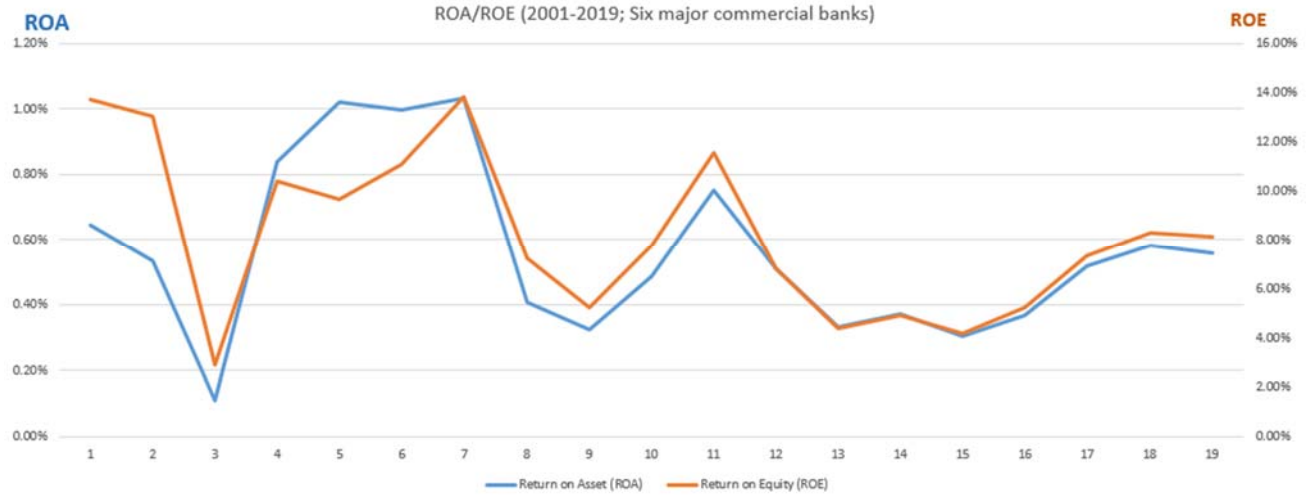


Figure A.1.8.

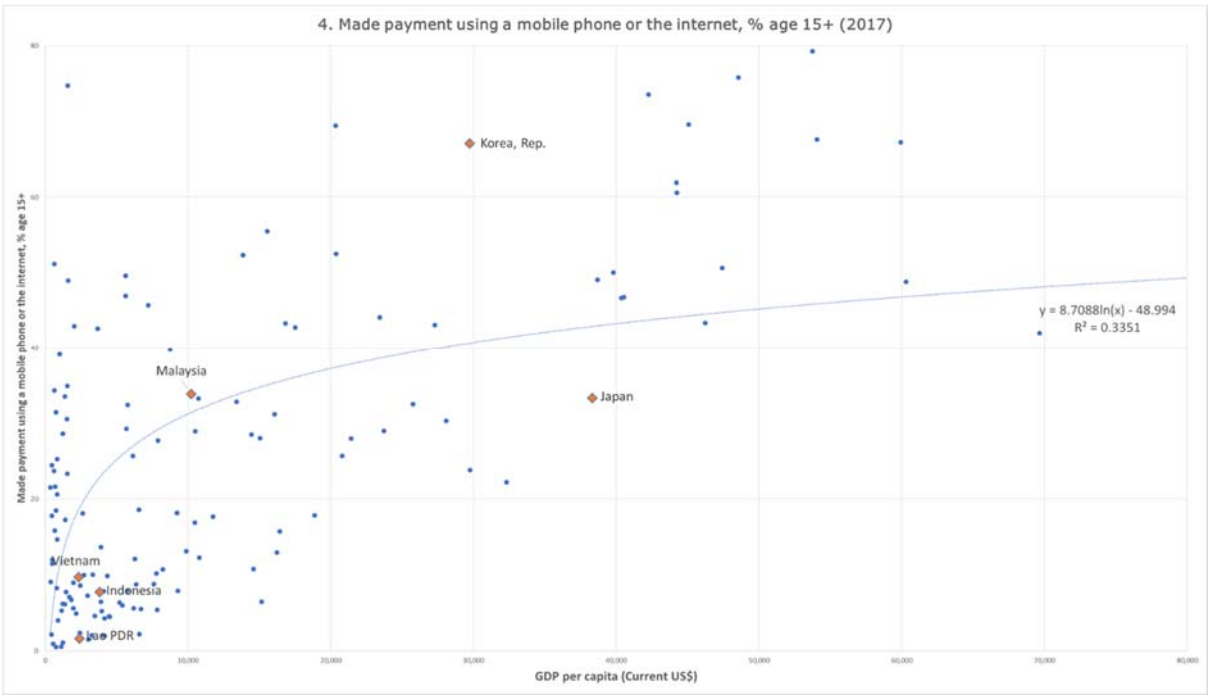


Appendix 1. Figures and Tables

Figure A.2. Interest rate trends in Korea (1987~2019)

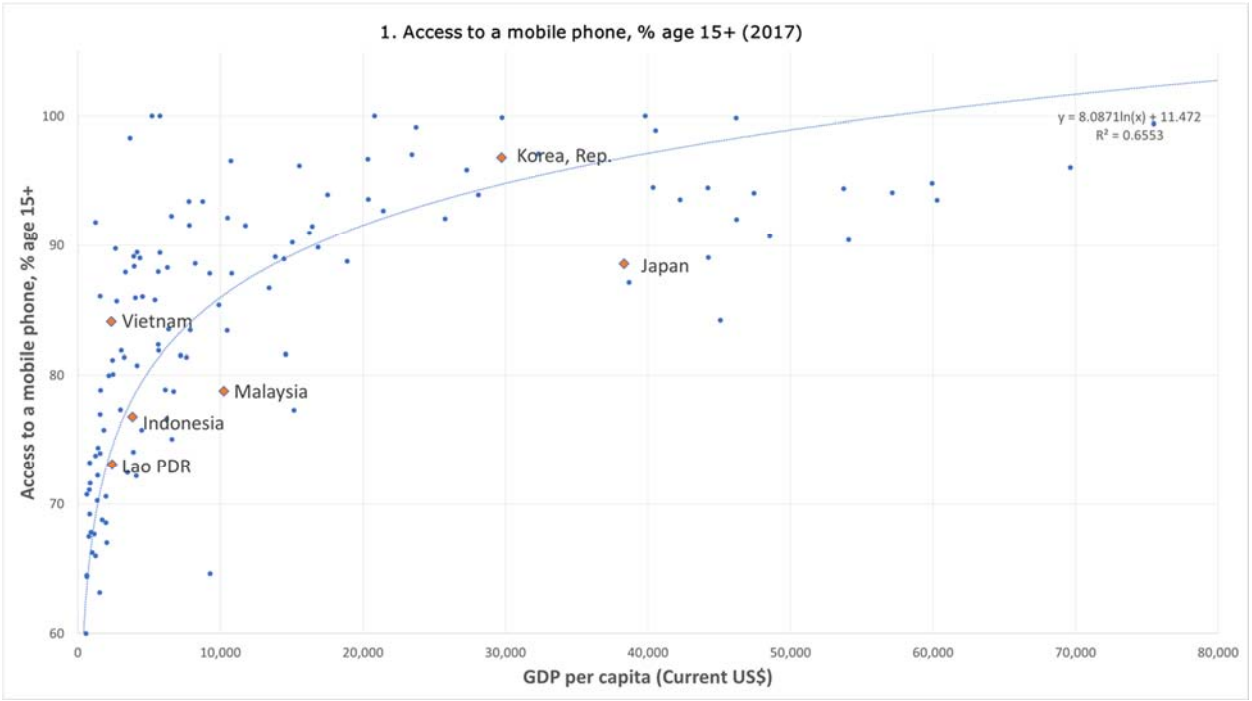
Appendix 2. Indicators for international of financial inclusion

Figure A.2.1. Percent of people who made a mobile or internet payment



Data source: The World Bank (2018)

A.2.2. Indicators of financial inclusion, an international comparison



A.2.3. Indicators of financial inclusion, an international comparison

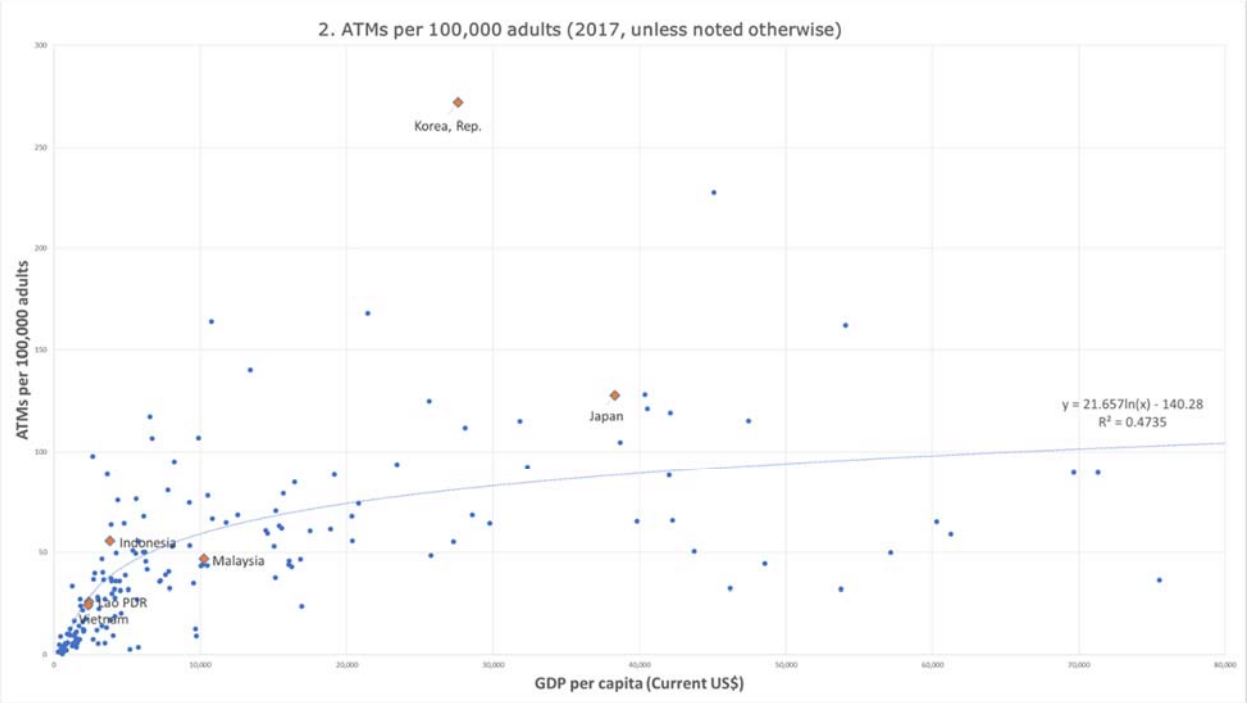
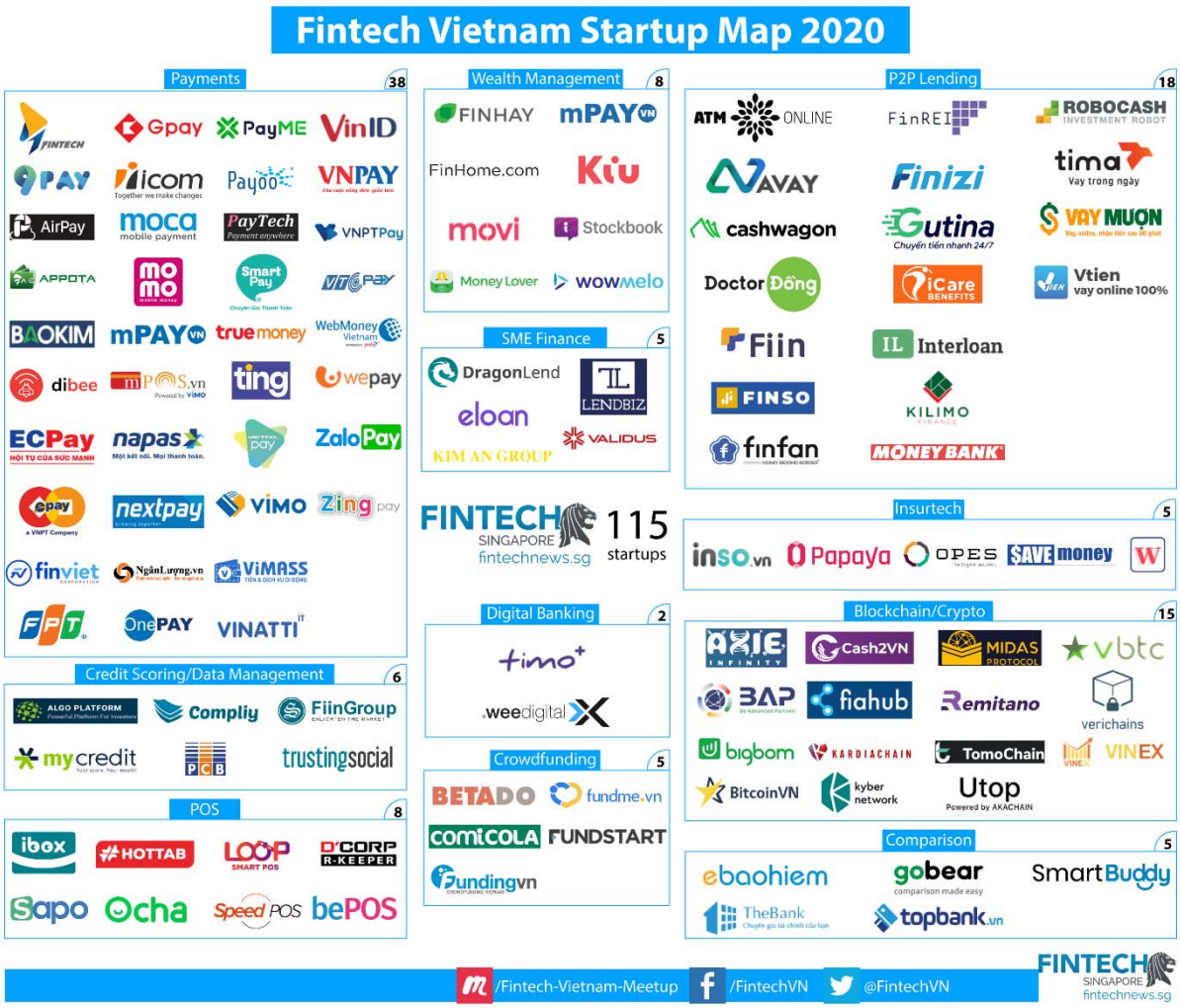


Figure A.2.4. The FinTech startups in Vietnam (as of 2020)



Source: fintechnews.sg