

Study on the impact of financial inclusion on national exports -- Evidence from 128 Countries

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Abstract. Since United Nation put forward the conception of financial inclusion in 2006, many countries, especially developing countries, have adopted financial inclusion development policies to promote inclusive growth and narrow the gap between rich and poor. Relying on unbalanced panel data from 2004-2019 at country level, we analyze the effect of financial inclusion on export size, which provides evidence for necessity to improve financial inclusion system. Our findings show that: (1) Financial inclusion development expands export size. (2) This effect is robust after soften endogeneity issues and measurement error. (3) Heterogeneity tests reveal that the effect is more obvious in developing countries and countries along the Belt & Road initiative (B&R).

Keyword: financial exclusion; export; B&R.

1. Introduction

Inclusive finance, as a policy approach to narrow the gap between rich and poor, is arousing more and more interests from scholars and policy makers. The origin of concept of financial inclusion dates back to the end of the 20th century, when some scholars put forward the concept of financial exclusion that banks shut down branches to reduce the availability to finance towards social groups. In 2006, with the purpose to solve the problem of “financial exclusion”, United Nation (2006) first put forward the concept of financial inclusion, which was later defined in bluebook as providing convenient financial services to low-income groups in underprivileged areas by improving financial infrastructure.

Although financial inclusion has gain more and more importance in many countries, the coverage of financial services are still at low level in many developing countries and even developed countries. Some research have shown that more than 2.7 billion people was undergoing financial exclusion and approximately 400 million SME was undergoing financial exclusion. Evans (2015) demonstrated that only 23% of adults have established accounts in banks. Therefore, the contribution of financial inclusion to economy and trade has not been realized and it's necessary to advocate financial inclusion development around the world.

Although countries have paid a lot of attention to financial inclusion, researches of welfare of financial inclusion mostly focused on the field of inclusive growth and income allocation, showing little interest in other factors. Based on the fact that many countries have adopted financial inclusion development strategies at country level, this paper seeks to investigate whether financial inclusion could promote economic growth through channels other than mitigating income inequality, which could support the advocacy of financial inclusion. In the context of economic globalization, trade has been an important way for economic growth and many developing countries have implemented export-oriented policy. Therefore, we investigate the impact of financial inclusion on export growth, providing theoretical implications for the design of financial inclusion policy.

Many researches have studied the relationship between financial development and trade volume and found that financial development has significantly positive effect on export size, which is more obvious in financially vulnerable sectors. The measure of financial vulnerabilities included two dimensions of outside financing dependence and ratio of tangible assets. Kletzer and Bardhan (1987) followed Heckscher-Ohlin model and then proved that, in financially advanced countries, industries more dependent on outside finance had comparative advantages. Therefore, industries depending more on finance exported and industries depending less imported. A large body of studies have

confirmed this conclusion (Cezar, 2014; Chaney, 2016). Manova (2013) found that the positive effect of financial development on trade volume was more obvious in industries with lower ratio of tangible assets. They have pointed out the reason that industries with lower ratio of tangible assets lack collateral for financing so these industries have comparative advantages in financially developed countries.

In conclusion, the researches above show that exporters depend more on external finance than domestic firms due to sunk costs, postponed payment and uncertainty risks. High-productivity firms can easily borrow loans from financial institutes because of good reputation. SME, however, should afford high borrowing costs thus cannot enter export markets. Therefore, we consider that financial inclusion can increase numbers of SME and their export size by providing them with loans at affordable costs.

Although a number of scholars have investigated the relationship between finance and trade theoretically and empirically, most literature concentrated on the depth of finance services, paying little attention on inclusion of financial services. In this case, some scholars started the researches on relationship between financial inclusion and trade. Mashayekhi (2015) proposed, from the perspective of trade policy, that financial inclusion development will not cause trade friction and trade liberalization can improve the development of financial inclusion. In addition, some scholars investigated the relationship between trade openness, economic growth and financial inclusion and found that financial inclusion could promote economic growth through trade openness (Maune, 2018; Hajilee and Niroomand, 2018; Chinoda, 2020). Aam and Khatoon (2021) utilized the panel data of 14 Asian countries and 17 African countries from 2004 to 2015 and drawn the conclusion that financial inclusion can significantly promote export performance.

Although the researches mentioned above dug into the link between financial inclusion and trade, few literature studied the impact of financial inclusion on export size. Therefore, the motivation of this research is to fill the gap in this field. The contributions are as follows: first, we creatively study the influence of financial inclusion development on export growth. Second, we use the proposal of Belt & Road initiative (B&R) as a quasi-natural experiment to alleviate the endogeneity issues. Finally, we collect unbalanced panel data of 200 countries for empirical analysis, which could provide a universal recommendation for policy makers.

The remainder of the paper is structured as follows. Section 2 presents our propositions. The data and empirical strategy used in the analysis is explained in Section 3. Section 4 demonstrates the results of the analysis. Section 5 concludes, summarizing the main results and implications and outlining future steps.

2. Proposition

Compared to domestic firms, exporters should face additional costs of fixed market entry costs, working capital requirement for postponed payment and uncertainty risks. In this case, high-productivity firms can earn enough revenues to cover the trading costs because of their outstanding marketing and production capabilities, while low-productivity firms cannot compensate for their export costs and choose not to enter the foreign market. Melitz(2003) has used firm heterogeneity model to confirm the view that only firms with productivity above threshold can enter foreign markets, while firms whose productivity is below threshold cannot enter. However, financial inclusion means that banks finance small-sized firms at affordable costs, which enable low-productivity firms to enter foreign markets and indirectly expand export size.

Hypothesis 1: financial inclusion could significantly promote the expansion of export size and extensive margin.

Although financial inclusion is a common goal of countries and has been paid attention to internationally, there is still significant difference between developing and developed countries. In 2017, 94% of adults have financial accounts in high-income countries, but this ratio is 65% in median-income countries and only 35% in low-income countries. Besides average income, financial inclusion

development is also positively correlated with employment, banks competition, human development, government management and internet usage, indicating that developing countries have lower level of financial development than developed countries. In developed countries with high level of financial development, export size is mostly influenced by factors other than finance and the effect of financial development is small. However, in developing countries, financial inclusion can greatly alleviate credit constraints and have significant impact on export size. Thus, we propose Hypothesis 2:

Hypothesis 2: compared with developed countries, the impact of financial inclusion on export size is more obvious in developing countries.

In 2013, China has proposed B&R to promote the construction of human community with a shared future, aiming at realization of policy dialogue, infrastructure facilitation, unimpeded trade, financial support and people-to-people exchange. Up to 2021, 67 countries in Asia, Africa, Europe has been included along the B&R. B&R included establishing free-trade areas, strengthening bilateral investment agreements and promoting the formation of cross-regional value chains(Huang,2016), which brings more trade opportunities to countries along the road. However, Manova(2010) have pointed out that firms could quickly response to trade policy in financially developed countries; while firms in financially poor countries could not immediately enter the market. In this case, financial inclusion development could help small firms to alleviate credit constraints and grasp the export opportunities brought by B&R. Based on these facts, we propose Hypothesis 3:

Hypothesis 3: the impact of financial inclusion on export size is more obvious in countries along the B&R.

3. Methodology

3.1 Data

The present research used four set of database: the first set is Financial Access Survey, which was launched in 2009 by IMF. This project collected the data of financial institutes from 189 different countries, enabling policy makers to better evaluate the level of financial inclusion development. This database involves abundant information of financial inclusion, including the amount of deposit accounts, ATMs and branches of financial institutes, usage of mobile money and ratio of loans to GDP of different sectors, which provides abundant variables for the construction of IFI. The second is CEPII BACI, which originated from 1994 and cover the bilateral trade data of more than 200 countries and 5000 goods, including exporters, importers, HS6 code and export value. The third is CEPII gravity, which originated from 1948, including variables required for estimation of gravity model, such as distance, language, religion and law origins. This database provides abundant control variables that are required to reduce the endogeneity in this research. The fourth is open data from world bank, which provides sufficient macroeconomic information of countries from all over the world. We used ISO 3-digit country code to merge data from different database and eliminated observations that has missing data in variables that are needed in this research. The final data construct is unbalanced panel data covering 128 countries from 2004 to 2019, totaling 1585 observations, among which totally 46 countries contained the full data of 16 years and each country had data of at least 2 years. The original data from CEPII gravity is obtained from: http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=8. last updated at 2019.

HS is Harmonized System, the entire name of which is International Convention for Harmonized Commodity Description and Coding System. This is a coding method for trading products and each number refer to a specific kind of product.

3.2 Variables

The core explaining variable in this research is financial inclusion so we should design a method to measure index of financial inclusion (IFI) exactly before testing the effect of financial inclusion on export size. Due to the construct of data available for this research, we used FAS database to construct

the IFI from three dimensions of availability, penetration and usage, based on (Sarma, 2016). The construction procedures are as follows:

(1) Design of index of different dimensions. For the availability dimension, we add the numbers of bank branches and mobile money agents per 100000 adults together to get the numbers of branches. Then, we used variable coefficient method to allocate weights to numbers of branches and ATMs respectively and add together to get the index of availability. For the penetration dimension, we used the number of deposit accounts per 1000 adults as a proxy for the number of banked adults. We get data on deposit accounts per 1000 adults from the following deposit takers: commercial banks, credit unions, MFIs and registered mobile money accounts. For the usage dimension, we added together the following indicators: total loans and deposits of banks and credit unions as percentage of GDP.

(2) Allocation of weights to dimensions. According to Sarma (2016), the dimension of penetration is weighted 1 and the dimensions of availability and usage are weighted 0.5.

(3) Measure of dimensions. We standardize values of each dimensions and multiply them by weights in step (2). The formula of calculation are as follows:

$$d_i = w_i * \frac{A_i - m_i}{M_i - m_i} \quad (1)$$

Where

w_i = weight attached to the dimension i, $0 \leq w_i \leq 1$

A_i = actual value of dimension i

m_i = lower limit on the value of dimension i

M_i = upper limit on the value of dimension i

We follow Sarma and set m_i as zero and M_i as 90 percentile to exclude the influence of outliers.

(4) Calculation of IFI. Based on the three dimensions of indicators above, a country's achievements of financial inclusion can be represented by a point $X = (d_1, d_2, d_3)$ on the n-dimensional cartesian space. In the n-dimensional space, point $O = (0,0,0)$ represents the lowest level of financial inclusion; while point $W = (w_1, w_2, w_3)$ represents the highest level of financial inclusion. The larger distance between X and O or the smaller distance between X and W indicates the higher level of financial inclusion. We define X_1 as normalized Euclidean distance of X from the worst point O , and X_2 as normalized Euclidean distance of X from the ideal point W . The formula of X_1 and X_2 are as follows:

$$X_1 = \left(\frac{d_1^2 + d_2^2 + d_3^2}{w_1^2 + w_2^2 + w_3^2} \right)^{1/2} \quad (2)$$

$$X_2 = 1 - \left(\frac{(w_1 - d_1)^2 + (w_2 - d_2)^2 + (w_3 - d_3)^2}{w_1^2 + w_2^2 + w_3^2} \right)^{1/2} \quad (3)$$

We incorporate both distance from point O and W in the construction of IFI:

$$IFI = \frac{X_1 + X_2}{2} \quad (4)$$

Table 1. Variables definitions

Variables names	Meanings of variables	Data origins
exp_val	Country's export value (unit: dollar)	CEPII BACI
Ifi	Index of financial inclusion, the construction method is as above	IMF FSV
gdp	Gross domestic product(unit: thousands dollars)	WB open data
gdpcap	Gross domestic product per capita (unit: thousand dollars per person)	WB open data
dist_av	The average distance from trading partners (unit: kilometer)	CEPII Gravity
wto	1 if country currently is a WTO member	CEPII Gravity
eu	1 if country currently is a EU member	CEPII Gravity
Comrelig_sum	Numbers of countries that have the same religion with export country	CEPII Gravity
Comcol_sum	Numbers of countries that have the same colonizer with export country after 1945	CEPII Gravity
Comleg_post_sum	Numbers of countries that have the same legal origin with export countries after 1991	CEPII Gravity
Rta_sum	Numbers of countries that sign RTA with export countries	CEPII Gravity
Col_dep_sum	Numbers of countries that currently have colonial or dependency relationship with export country	CEPII Gravity

The explained variable in this research is country's total trade value, which is calculated by adding trade value of different products and destination countries together in each year. CEPII Gravity database provide abundant control variables in this research. However, too many variables contained in estimation will cause data overfitting. To prevent this problem, we use lasso regression to select 10 control variables to be involved. The definitions of variables used in this research are displayed in tables 1.

3.3 Model

In this research, we use fixed-effect panel regression to estimate the effect of IFI on export size. The model specification is as follows:

$$\ln(\exp_val_{it}) = \beta_0 + \beta_1 * ifi_{it} + \varphi * \chi_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

Where i and t represent export country and time respectively; the explained variable($\ln_exp_val_{it}$) is the logarithm of export value; ifi_{it} is financial development index, which is the core explaining variable in the model; χ_{it} is the control variables in table 1 and we use the logarithm of GDP. Furthermore, we add α_i and λ_t into specification as country-fixed effect and time-fixed effect to exclude the influence of unobservable factors. ε_{it} is the residual.

4. Results

4.1 Baseline Regressions

Table 3 reports the baseline regressions of financial inclusion development on export size and extensive margin. In column (1), the regression model only includes core explaining variable and controls for country and year fixed effects. In column 2-4, we add additional control variables. The result remains significant, indicating that our baseline findings are robust.

Table 2. Baseline results

variables	(1)	(2)	(3)	(4)	(5)	(6)
	ln exp val	ln exp val	ln exp val	ln exp val	ln desti num	ln prod num
ifi	.535*** (6.834)	.23*** (2.925)	.238*** (3.022)	.263*** (3.257)	0.252*** (7.86)	0.852*** (15.82)
Indist_av		-1.388*** (-4.142)	-1.39*** (-4.169)	-1.448*** (-4.359)	-0.184*** (-6.87)	-0.362*** (-6.66)
lngdp		.46*** (10.698)	.459*** (10.65)	.471*** (10.082)	0.114*** (37.06)	0.232*** (39.07)
gdpcap		-.001 (-.564)	-.001 (-.539)	-.002 (-.861)	-0.003*** (-8.75)	-0.009*** (-12.50)
eu			.174*** (5.057)	.132** (2.397)	-0.157*** (-6.46)	-0.486*** (-10.79)
wto			-.043 (-.524)	-.042 (-.511)	0.272*** (11.40)	0.500*** (12.61)
comrelig_sum				.100* (1.789)	0.002*** (4.68)	0.002*** (3.52)
comcol_sum				.062* (1.742)	0.001*** (4.53)	-0.000 (-0.13)
comleg_post_sum				-.056** (-2.358)	-0.000 (-1.64)	-0.001*** (-2.82)
rta_sum				.001 (1.12)	0.003*** (10.78)	0.008*** (13.37)
col_dep_sum				-.035 (-1.367)	0.010** (2.02)	0.025*** (2.64)
Country fixed effect	Yes	Yes	Yes	Yes	No	No
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
observations	1585	1585	1585	1585	1585	1585
R ²	.991	.992	.992	.992	.849	.886
adjustedR ²	.990	.991	.991	.991	.847	.884

4.2 Robustness Tests

4.2.1 Endogeneity Issues

To eliminate the endogeneity issues of reverse causality, we use the IFI lagging by one period as instrument variable for financial inclusion and adopt the two stage least squared method (2SLS) as identification strategy. As shown in column (1) of table 4, the financial inclusion still has a significantly positive influence on the export size after addressing endogeneity problems. Additionally, the first-stage F statistic is 4278, greatly exceeding the critical value of 10, which indicates that the instrument variable has a strong correlation with the endogenous explaining variable. In conclusion, the previous test validates that the choice of instrument variable is appropriate and the 2SLS estimation based on this is credible.

4.2.2 Other Construction of IFI

Due to the fact that the data available cannot perfectly proxy for the availability and usage dimensions, the weights given to these two dimensions are smaller than that of penetration dimension in the construction of IFI. However, this method may cause the concern of measurement error which will bias the estimation results. To address this concern, we use variable coefficient method, which is frequently used in the synthesis of indicators of different dimensions, to construct the IFI. Specifically, we use the ratio of standard deviation and mean value of each dimensions as its own weight and keep the other steps the same. As shown in column (2) of table 4, the coefficient of ifi2 (IFI constructed by variable coefficient method) is significantly positive, indicating that financial inclusion development promote the size of country's export.

4.2.3 Methods to Deal with Outliers

In the process of construction of IFI, we use 90 percentiles as upper limits for standardization to exclude the influence of outliers. However, this approach may neglect all countries with values above the upper limit, some of which may be important to be included in the estimation. To address this outliers issue, we conduct several tests that use different percentiles as upper limits in the process of standardization. As shown in columns (3)-(5) of table 4, the coefficients of ifi95, ifi99 and ifi100 (using 95 percentile, 99 percentile and maximal value as upper limit respectively) still remain significantly positive at 1% level. All of the robustness check above improve the reliability of hypothesis 1.

Table 3. Robustness tests

variables	2SLS ln_exp_val (1)	Alternative measure of IFI ln_exp_val (2)	Different method to deal with outliers ln_exp_val (3)
ifi	.344*** (3.725)		
ifi2		.3*** (3.201)	
ifi95			.277*** (3.145)
Control variables	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
Observations	1451	1585	1585
R ²	.992	.992	.992
Adjusted R ²	.991	.991	.991

4.3 Heterogeneity tests

4.3.1 Developed vs. developing countries

As generally known, there are significant differences between developed and developing countries in the aspect of economic growth, financial inclusion development and trade patterns. Based on these

economic and financial differences, is there heterogeneity in the effect of financial inclusion development on export size between these countries? To answer this question, we perform a subsample analysis in which we divide countries with GDP per capita above 10 thousand dollars into developed countries, and the other into developing countries. The regression of subsamples is as follows in columns (1)-(2) of table 5, which show that the coefficient of developed countries is insignificantly positive at 10% level while the coefficient of developing countries is significantly positive at 10% level. This result reveal that financial inclusion has no effect in developed countries but play an positive role in the size of developing country's export. To figure out the mechanism behind this result, we add the square of IFI in column (3) of table 5. The coefficient is significantly negative, indicating that the effect of ifi on export size is a reverse "U" shape curve. Most developed countries are on the right side of curve, so their coefficient is not that significant as developing countries. This result also implicates that developed countries should not only improve the quality of financial service, but also focus on other relevant factors in the design of export-promoting policy. Based on the analysis above, hypothesis 2 is validated.

Table 4. Heterogeneity tests

Variables	Developed countries	Developing countries	(3)	(5)
	(1) ln_exp_val	(2) ln_exp_val	ln_exp_val	ln_exp_val
ifi	.041 (.235)	.207* (1.919)	1.045*** (5.377)	.221*** (2.678)
ifi*ifi			-.743*** (-4.556)	
Belt*post*ifi				.297*** (3.833)
Belt*post				-.182* (-1.946)
Control variables	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
observations	478	1105	1585	1585
R ²	.996	.988	.992	.992
Adjusted R ²	.995	.987	.991	.991

4.3.2 B&R Countries

To go with the tide of economic globalization, China initiate the construction of "Silk Road Economic Belt" and "21st Century Maritime Silk Road" in 2013, aiming at infrastructure development, policy dialogue, unimpeded trade, financial support and people-to-people exchange. So far, B&R has gone across 66 countries in South-eastern Asia, South Asia, Middle Asia, West Asia and Middle-east Europe. Now that one of the objective of B&R initiative is to eliminating the barriers of trade among these countries, we generate dummies to figure out whether heterogeneous effect exists in these countries. We set the dummy variable "belt" as one if the country is on the line of B&R and other as zero. We also set another dummy variable "post" as one if the year is behind 2013, and other as zero. After defining dummy variables, we add interaction "belt*post*ifi" and "belt*post" into regression model. The regression result is reported in column (5) of table 5, which shows that the coefficient of "belt*post*ifi" is significantly positive at 1% level, which indicates that the construction of B&R significantly improve the effect of financial inclusion on export size. Therefore, hypothesis 4 is validated.

5. Conclusions and discussion

The rise of concept of financial inclusion and development of inclusive financing system not only promote regional inclusive growth, but also increase country's export size. To figure out whether

there is a relationship between financial inclusion and export growth, we conduct an empirical research with unbalanced panel data covering 128 countries from 2004 to 2019. The former researches about financial development and trade mostly focus on the depth of financial development, but neglect the inclusiveness of itself. This research fill the gap by analyzing the effect of inclusiveness of financial development on export size and draw conclusions that not only have profound theoretical implications, but also provide important policy guidance for developing countries and those along B&R:

First, financial inclusion development can significantly increase country's export size. Thus, hypothesis 1 is verified. Moreover, the conclusion is still robust after several robustness tests. The implication of hypothesis 1 is that government should design relevant policies and evaluate the level of financial inclusion to promote the development of financial inclusion. Besides, export-oriented countries should focus on financial development inclusion to promote regional inclusive growth, reduce the gap between the rich and the poor and, most significantly, increase the export size.

Second, we analyze the heterogeneous effect of financial inclusion on export growth in different countries. We find that the positive effect of financial inclusion on export size is more obvious in developing countries and countries with shorter trading distance or along B&R, which verifies hypothesis 2-3. The practical implications of hypothesis 2-3 are that (1) given the low level of financial development and position on the left side of "U" shape curve, policy-makers in developing countries should adopt policies to construct financial infrastructure and improve the level of financial inclusion, (2) for countries along B&R, development of financial inclusion can significantly increase the export size, further promoting infrastructure development, policy dialogue, financial support and people-to-people exchange, which help to realize the objectives of B&R.

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