

Research Article

Stability Analysis and Financial Inclusion of Foreign Trade and Financial Data Based on Panel Data Pairs of Different Countries

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There is a complex relationship between financial inclusion and financial stability. In order to explore the relationship between them, this paper proposes a mechanism by which foreign trade affects financial inclusion through financial stability and uses fixed effects analysis and time-variant analysis of variance for the results. Four different criteria were used: GNI per capita, GDP per capita, life expectancy, and infant mortality. The experimental results show that to achieve financial inclusion, policymakers should consider improving foreign trade flows, rational allocation of foreign exchange reserves, and improving credit markets to a certain extent.

1. Introduction

With the rapid development of global economic integration, financial inclusion, which is typically understood as access to formal financial services such as credit, insurance, and secure saving opportunities, has in recent years been identified as a critical engine of economic growth [1–3]. Moreover, as another important macroeconomic variable, foreign trade irons out wild fluctuations in prices, equalizes the prices of goods, and provides better standard of living. As a hit subject in recent years, financial inclusion remains a controversial concept, and the most accurate definition needs to be discussed. It is defined as the process of delivering accessible financial services to all members of the community, with a focus on vulnerable groups such as the weaker portions and low-income individuals [4–6]. Therefore, we propose the question that what is the relationship among foreign trade, financial stability, and financial inclusion?

With the heated discussion of financial inclusion, the profile of another indicator of financial sector has been raised [7–9]. Financial stability, which refers to the reliable service of the institutions and markets that make up the financial system, is also critical for economies to run effectively [10–12]. According to definition from Bank of Korea, financial stability can be more broadly defined as “a condition in which the financial system can facilitate economic activities smoothly and is capable of unraveling financial imbalances arising from shocks.” The stability of the financial system, as evidenced by markets that are functioning well, by key institutions that are operating without major difficulty, is vital to economies achieving the objectives of sustained growth [13]. Financial stability is closely related to financial inclusion [14].

On one hand, the variable measuring foreign trade is significant to financial inclusion and is one of the determinants of financial inclusion, indicating that foreign trade can affect financial inclusion. According to a previous theoretical research, financial inclusion and foreign trade have a positive relationship [15]. Furthermore, the theory suggests that the level of financial development may have a significant effect on the functioning of international trade flows [16]. On the other hand, developing economies are seeking to promote financial inclusion, which leads to the question of whether financial stability and financial inclusion are, broadly speaking, substitutes or complements. Previous studies tended to find positive effects of greater financial inclusion on financial stability that the two are complementary [17, 18]. However, in a recent research, the World Bank admits that only a little amount of empirical research has been done on the precise links between financial inclusion.
and financial stability [19]. Due to their bi-directional influence mechanism, this article only focuses on how financial stability may affect financial inclusion. The reverse mechanism will not be discussed.

These two different research perspectives reflect the complexity of understanding financial inclusion. Whether it is the relationship between foreign trade and financial inclusion, or between financial stability and financial inclusion, evidence with regard to these correlations is mixed and inconclusive across countries and methodologies. Hence, a question is proposed that whether financial stability is an intermediary variable to make foreign trade and financial inclusion a complete influence mechanism.

This article provides a new perspective of exploring the nexus between foreign trade and financial inclusion and identifies the mechanism of how foreign trade affects financial inclusion. The contributions of this article are as follows. First, it concludes data from 266 countries and regions globally, expanding the research perspective of small- and medium-sized enterprises (SMEs) to the macro level. It also highlights that as one of the significant determinants of financial inclusion, foreign trade can deepen financial inclusion through financial stability. Also there are few empirical studies examined the impact of foreign trade on financial inclusion, and this article contributes to the literature on this subject by estimating the mediation effects of financial stability between foreign trade and financial inclusion.

2. Hypothesis

Financial inclusion benefits the economy as it would make credit available to small businesses which would boost the level of local economic activities [20]. Financial inclusion will also allow financial markets to be within the reach of all citizens that want to engage in economic activities [21]. As more and more chances make it available for disadvantaged and low-income groups of society to receive financial services [22–24]. The multidimensional nature of financial inclusion and the complexity to understand it can be extrapolated [25].

Empirical work shows that foreign trade is one of the determinants of financial inclusion. “Manufactures and export share,” which is one of the massive variables used to measure foreign trade, is close to significant to financial inclusion at the 10% level with a p value of 0.11 [1]. Moreover, the reduction in foreign trade result from large global banks pulling out of emerging countries may hurt financial inclusion by raising the cost of cross-border payments or driving firms towards less regulated or unregulated channels [26, 27].

Despite financial inclusion and foreign trade are linked closely, there has been little empirical research on how foreign trade affects financial inclusion. Therefore, we propose Hypothesis 1:

Hypothesis 1. Foreign trade could directly promote financial inclusion.

Moreover, according to financial growth theory, having access to safe and accessible financial resources is critical for increasing growth and reducing income inequality and poverty [28, 29]. This is critical to improving financial inclusion by providing efficient, accessible and secure payment systems. Macropreudential policies conditional on better institutional quality and financial development improve financial inclusion, which has important policy implications for financial stability as well [30]. Some study proves a one-way positive relationship between financial inclusion and financial stability [19, 31]. Though some may think that this direction of causality from financial stability to financial inclusion seems to have a clear conclusion as it is unlikely that financial stability could worsen financial inclusion of a country, the empirical research is rather thin.

Hence, we propose Hypothesis 2:

Hypothesis 2. Financial stability could directly promote financial inclusion.

Moreover, the phrase “financial stability” has in the past decade come to signify an important function of central banks and certain other public authorities [32]. Around 60% of all foreign trade transactions are financed through trade credits, which is one of the key variables determining the bank structure. Its frequent swings have an impact on banks, financial institutions, and even the financial system’s stability. We consider linking financial inclusion with foreign trade by introducing financial stability as a mediating factor since the most widespread definition of financial inclusion is having access to credit from a formal financial institution.

Considering these facts, we propose Hypothesis 3:

Hypothesis 3. Foreign trade has an indirect positive impact on financial inclusion via financial stability.

Since the development of financial inclusion is significantly influenced by foreign trade, fiscal freedom, and the depth of credit [14], we take economic policy into consideration. The role of macroeconomic policy is to broaden financial inclusion to reach those who are excluded, creating a more stable financial environment as well [33, 34]. Based on the World Bank data, countries along OBOR account for 48% of the world population, but only 18% of total GDP, 23% of trade, and 25% of investment. Since foreign trade and investment with financial support can contribute to stable financial system and promote economic growth of these countries [35], the levels of financial inclusion rise in response to both prosperity and declining inequalities [9].

Hence, we propose Hypothesis 4:

Hypothesis 4. Financial inclusion in countries along the One Belt One Road (OBOR) initiative is more influenced by foreign trade than those not along OBOR initiative.

Moreover, there are great differences between the research on financial inclusion in developing countries and developed countries [36]. As a result, many developing
countries have advocated financial inclusion as a strategic goal, especially in the Association of Southeast Asian Nations (ASEAN) region to provide low-income households and small firms with an equal opportunity to access financial services [37]. Financial inclusion requires a healthy financial market for long-term growth. As an important factor influencing financial markets, foreign trade for economic growth and development is difficult to underestimate [38]. Foreign trade has an important share in GDP in different countries and stimulates economic growth of countries that are now so interconnected [39]. Foreign trades and economic growth co-integrate through strengthened macroeconomic policy stability [40, 41], and they vary significantly from developed countries to developing countries.

It seems that the improved access to financial services in developed countries is associated with foreign trade and globalization. Since the difference of factor endowment determines the benefit of participating in the trading and globalization system and the global economy follows the principle of distributing benefits according to factor scarcity, developed countries have the main scarcity factors, so they may get higher returns. As the dominating section in foreign trade industry and the biggest beneficiary of globalization, developed countries may be more positively affected by foreign trade during the process of improving financial inclusion.

Therefore, we propose Hypothesis 5:

**Hypothesis 5.** Compared with developing countries, developed countries are more significantly affected by foreign trade on maintaining financial inclusion.

### 3. Methodology

#### 3.1. Data

The data are from World Development Indicators, the Human Development Index from United Nations Development Program, the World Bank’s Global Financial Development Database (GFDD), and the IMF’s FAS. The data are for the 2004–2020 period. Our collected sample is at the country level, which includes 266 countries and regions globally. As dimensions of financial inclusion are largely motivated by the availability of relevant and consistent data, we consider to use data imputation. Since the number absent data of the indicator "deposit accounts per 1000 adults" is up to 3732, indicating severe data missing. We use linear interpolation and extrapolation and then replace the remaining missing values with 0. The samples of the financial inclusion indicator dataset have been enlarged to 2108.

#### 3.2. Variables

**3.2.1. Construction of Financial Inclusion**

(1) The indicators of financial inclusion system: Financial inclusion is the major dependent variable, which refers to a multidimensional indicator of financial inclusion. Based on the indicators recognized in academia, the impact will be measured by three dimensions, which are banking penetration, availability, and usage. An inclusive financial system should penetrate widely among its users [42], so banking penetration is used to measure the proportion of people having a bank account. We use number of deposit bank accounts per 1000 adult population as an indicator. The second dimension, availability, which measures the access to banks, is quantified by two indicators: (1) number of bank branches and (2) number of ATMs per 100,000 adults. As for the third dimension, the usage of an inclusive banking system can be in many forms. We use volume of credit to the private sector and as proportion of the country’s GDP to measure it. The specific calculation of the IFI indicators is in Table 1.

(2) Dimension weight: Although indicators from all three aspects are all significant in determining the level of financial inclusion, the three dimensions should be given different weights due to the lack of sufficient data for availability. Specifically, the weight of penetration is 1, and the weight of availability and usage is 0.5 each.

(3) Measurement of each dimension: We use a comprehensive measure that combines information on all aspects (or dimensions) of financial inclusion into a single number. Such a measure is easy to compute and comparable across economies and over time.

The first step is to compute a country’s achievement in each dimension of financial inclusion, using a dimension index. The dimension index $d_i$ is computed by the formula below. A weight $w_i$ such that $0 \leq w_i \leq 1$ is attached to the dimension $i$, indicating the relative importance of the dimension $i$ in quantifying the inclusiveness of a financial system:

$$d_i = w_i \frac{A_i - m_i}{M_i - m_i},$$

where $w_i$ is the weight of dimension $i$, $A_i$ is the true value of dimension $i$, $m_i$ is the low value of dimension $i$, and $M_i$ is the high value of dimension $i$. According to Sarma’s practice in the paper, the low value $m_i$ is set as 0, and the high value $M_i$ is set as the 90th quantile of dimension $i$.

According to the three-dimensional index calculated above, the development degree of financial inclusion in a certain country can be expressed by point $X = (d_1, d_2, d_3)$ in $n$-dimensional Cartesian space. The point $O = (0, 0, 0)$ represents the country with the poorest level of financial inclusion, implying total financial exclusion. The point $W = (w_1, w_2, w_3)$ represents the country with the highest degree of financial inclusion development, and there is no financial exclusion in this country. If a point is closer to $W$ point, the country has a higher degree of financial inclusion development. Set $X_1$ to be the standard Euclidean distance between $X$ and $O$, and $X_2$ to be the standardized Euclidean
distance between $X$ and $W$. $X_1$ and $X_2$ are calculated as follows:

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

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

Equation (2)

We include two distances in the construction of IFI:

$$IFI = \frac{X_1 + X_2}{2}. \quad (3)$$

3.2.2. Foreign Trade. As independent variable, foreign trade depicts the level at which countries or economies allow trade or trade with other countries or economies. The ratio of net imports to nominal GDP (i.e., imports minus exports) is used to calculate it [43, 44]. The portal of G20 financial inclusion indicators is powered by the World Bank’s Data Group, and it measures access and use of quality of financial services, which countries might employ to help them achieve their financial inclusion goals. These data are widely used in the field of finance-related research.

3.2.3. Financial Stability. There are numerous definitions of financial stability. Most of them have in common that financial stability is about the absence of system-wide episodes in which the financial system fails to function (crises). As monitoring the risk of the banking sector is a crucial part of assessing the stability of financial systems, our primary mediating variable is bank capital to assets ratio (%), bank credit to deposits, and the ratio of nonperforming loans (NPLs) to gross loans. The capital ratio is a well-known measure which is linked negatively to the probability of financial breakdown occurrence. It can also be used to measure financial regulation [45], which promotes financial stability. The bank credit to deposits ratio is applied to capture the liquidity risk exposure. The ratio of nonperforming loans to total loans is widely used as a measure of credit risk [46].

3.2.4. Control Variables. We employ market capitalization of listed domestic companies (% of GDP), inflation consumer price (annual %), and GDP per capita as control variables. Market capitalization (also known as market capitalization) is the share price of a domestically listed company multiplied by the number of shares outstanding (including their several categories). Investment funds, unit trusts, and companies whose objective is to own shares in other listed companies are excluded. Data are end of year values (World Bank). Inflation, as measured by the consumer price index, reflects the percentage change in the cost of a basket of goods and services to the average consumer from year to year, which may be constant or change at particular time periods, such as yearly. The Laspeyres formula is generally used (World Bank). GDP per capita is gross domestic product divided by midyear population. Data are in current US dollars (World Bank).

3.3. Model. The main basic empirical equation of Hypothesis 1 is

$$IFI_{it} = \alpha_i + \lambda_t + \beta_0 \text{trade}_{it} + \phi z_{it} + \epsilon_{it}, \quad (4)$$

where $i$ and $t$ represent country and time, respectively; IFI indicates the extent to which financial inclusion has developed in different countries; $\alpha_i$ is the individual effect; $\lambda_t$ is the time fixed effect; $\text{trade}_{it}$ represents foreign trade, which is measured by net import; $z_{it}$ contains control variables; and $\epsilon_{it}$ is the residual.

In the theoretical analysis, we propose that financial stability can also directly affect financial inclusion. Therefore, the model of Hypothesis 2 is designed as

$$IFI_{it} = \alpha_i + \lambda_t + \beta_1 \text{stability}_{it} + \phi z_{it} + \epsilon_{it}, \quad (5)$$

where stability$_{it}$ is a status in which the financial system is resistant to economic shocks, measured by bank capital to assets ratio (%), bank credit to deposits, and NPLs to gross

| Dimension          | Index                                      | Data source                      | Coverage           |
|--------------------|--------------------------------------------|----------------------------------|--------------------|
| Banking penetration| Number of deposit bank accounts per 1000 adult population | G20 Financial Inclusion Indicators | 2004-2020 266 countries |
|                    | Number of bank branches per 100,000 adults  | World Development Indicators     | 2004-2020 266 countries |
| Availability       | Number of ATMs per 100,000 adults           | World Development Indicators     | 2004-2020 266 countries |
| Usage              | Volume of credit to the private sector and as proportion of the country’s GDP | World Development Indicators     | 2004-2020 266 countries |
loans; the remaining variables have the same meanings as the ones listed above.

Moreover, foreign trade may have an indirect impact on financial inclusion through financial stability. Therefore, we put the adjustment variable into the model to test if the influence mechanism is significant.

The model of Hypothesis 3 is designed as

\[ \text{IFI}_it = \alpha_i + \lambda_i + \beta_2 \text{tradestability}_it + \beta_3 \text{trade}_it + \phi z_{it} + \varepsilon_{it}, \]  \hspace{1cm} (6)

where \( i \) and \( t \) represent country and time, respectively; \( \text{IFI} \) indicates the extent to which financial inclusion has developed in different countries; \( \alpha_i \) is the individual effect; \( \lambda_i \) is the time fixed effect; \( \text{tradestability}_it \) represents intersection of foreign trade and financial stability; \( z_{it} \) contains control variables; and \( \varepsilon_{it} \) is the residual.

### 4. Empirical Findings

#### 4.1. Main Model

Based on data collected from 266 countries, we use fixed effect model. Table 2 shows the regression results of trade and \( \text{IFI} \). The variable foreign trade is significant at 1% level, and the correlation coefficient is 0.003, indicating that foreign trade can promote financial inclusion directly, which proved Hypothesis 1.

Model 1 estimates the impact of foreign trade on financial inclusion, and model 2 focuses on the nexus of financial stability and financial inclusion. Financial stability is a multidimensional notion that creates a stable financial system, being able to resist financial shocks which are adequate to notably mess up the distribution of savings to lucrative investment alternatives. However, the literature on the relationship of financial stability and financial inclusion is rather thin and provides mixed evidences. Therefore, we use three different indicators of stability to construct a fixed effect model.

| Variable                                    | Coefficient (t-stat.) |
|---------------------------------------------|-----------------------|
| Foreign trade                               | 0.003***              |
| Market capitalization of listed domestic companies | 0.001***              |
| Inflation, consumer prices                  | 0.001**               |
| GDP per capita                              | 0.000***              |
| N                                           | 2108                  |
| \( R^2 \)                                   | 0.048                 |

\( t \) statistics in parentheses. *\( p < 0.1 \), **\( p < 0.05 \), ***\( p < 0.01 \).

#### 4.2. Mediation Effect

Beck, Demirguc-Kunt, and Levine [48] find that the development of financial inclusion is closely linked to indicators of banking sector development, such as the bank capital ratio and the credit-to-deposit ratio. As foreign trade can improve financial inclusion to some extent, we propose the influencing mechanism of trade-financial stability-financial inclusion. We, respectively, multiply bank capital to assets ratio, bank credit to deposits, and NPLs to gross loans by foreign trade to construct intersections. The names for three new variables generated are trade-stability1, trade-stability2, and trade-stability3. Table 4 shows the fixed effect model result.

We can see from Table 4 that the variable trade-stability1 is significant at the 1% level, and the correlation coefficient is 0.0002. Trade-stability2 is not significant, and trade-stability3 is significant at the 1% level, and its correlation coefficient is 0.0002. Therefore, foreign trade may affect financial inclusion by changing the capital ratio of banks, which proves Hypothesis 3. Based on the theory proposed by William H. Branson, who is considered to be a pioneer in the field of international economics, we propose that foreign trade, which can be regarded as short-term capital flows, can affect money supply and the lending ability of banks by affecting foreign exchange reserve. It also has an impact on the bank capital to assets ratio. Once banks have sufficient funds to lend, their loans may face moral hazard. With the fluctuation of this kind of short-term cross-border funds, not only would the banks themselves be affected, but the stability and inclusion of the financial system will be affected as well.

#### 4.3. Subsample Test

Macroeconomic policy may have great influence on financial inclusion as a powerful external shock. First announced in 2013, One Belt One Road represents a resurrection of the ancient trade routes known as the Silk Road, which connected China with the economies of nearly 70 other countries across several continents. One of the main arguments for the OBOR is that increased global trade
can lead to global growth. OBOR can help these countries improve their transportation, energy production, and trade. Since China has signed 174 cooperation documents on One Belt One Road Cooperation with 126 countries and 29 international organizations so far, we introduce a dummy variable BR. If countries are along One Belt One Road, BR is defined as 1. If countries are not along One Belt One Road, BR is defined as 0. Then, we applied the fixed effect model. Table 5 shows that the foreign trade in countries which are along OBOR is significant at 1% level and the absolute value of correlation coefficient is 0.004, which is twice as big as the coefficient of developing countries. The result indicates that OBOR policy has a positive effect on financial inclusion through foreign trade. It proves Hypothesis 4. The initiative aims to improve policy coordination, facilities, connectivity, unrestricted trade, and financial integration, all of which have a significant impact on economic development [49]. The unimpeded trade it proposed has connected countries globally and improved the level of economic development of countries along the route.

|                | (1) IFI | (2) IFI | (3) IFI |
|----------------|--------|--------|--------|
| Bank capital to assets ratio (%) | 0.015*** (16.110) |
| Bank credit to deposits (%) | 0.002*** (12.620) |
| NPLs to gross loans (%) | 0.011*** (12.082) |
| Market capitalization of listed domestic companies | 0.001*** (3.800) | 0.001*** (5.045) | 0.001*** (4.780) |
| Inflation, consumer prices | 0.001*** (3.134) | 0.001*** (2.632) | 0.001*** (2.822) |
| GDP per capita | 0.000*** (3.346) | 0.000*** (7.955) | 0.000*** (7.497) |

Table 3: FE model result of financial stability and financial inclusion.

|                | (1) IFI | (2) IFI |
|----------------|--------|--------|
| Tradestability1 | 0.0002*** (3.805) |
| Tradestability3 | 0.0002*** (3.869) |
| Foreign trade | 0.002*** (3.463) | 0.002*** (3.962) |
| Market capitalization of listed domestic companies | 0.001*** (4.175) | 0.001*** (4.103) |
| Inflation, consumer prices | 0.001*** (2.478) | 0.001*** (2.477) |
| GDP per capita | 0.000*** (7.807) | 0.000*** (7.543) |

Table 4: Mediating effect of financial stability.

\( t \) statistics in parentheses. \( * p < 0.1 \), \( ** p < 0.05 \), \( *** p < 0.01 \).
Furthermore, because there are significant and discernible inequalities in the living standards of people in different countries [50], foreign trade may affect financial inclusion to varying degrees. As a subsample heterogeneity test, we apply different classifications to divide the samples into developed countries and developing countries and carry out subsample regression.

Countries have been classified by their level of development as measured by per capita gross national income (GNI) [51]. Low-income countries have a GNI per capita of less than $1,035; lower-middle-income countries have a GNI per capita of between $1,036 and $4,085; upper-middle-income countries have a GNI per capita of between $4,086 and $12,615; and high-income countries have a GNI per capita of more than $12,615 (World Bank). Low-income and lower-middle-income countries are commonly referred to as developing countries, whereas upper-middle-income and high-income countries are known as developed countries.

The results of subsample regression are listed in Table 6. It shows that compared to developing countries, developed countries have more significant coefficients and larger absolute values for foreign trade, which proves Hypothesis 5: Compared with developing countries, developed countries are more significantly affected by foreign trade on maintaining financial inclusion. Even though the number of special and differential treatment clauses concerning trade facilitation in developing countries has reached 155, many of them have not been well implemented. It may result in domestic economic fluctuations, which has a risk weakening the positive effect of foreign trade itself on financial inclusion.

It may not be persuasive to just classify countries based on GNI per capita as the number of subsamples is not balanced. So there may be sample deviation. We use another criterion being whether per capita GDP is more than 12, 235 US dollars [52]. Table 7 shows that for developed countries (GDP per capita more than 12, 235 US dollars, only 23.7% of the whole), the coefficient is still significant. The absolute value is larger than that of developing countries (76.3%). Therefore, it strongly supports the validity of Hypothesis 5.

However, there are still shortages to defining developed countries by GNI per capita or GDP per capita as they are both indicators of the economic aspect. The development of countries should be measured in multiple ways, which contain levels of education, literacy, and health. We use other factors to determine development status. Measures of standard of living, such as infant mortality and life expectancy, are useful. Although there are no set boundaries for these measures either, most developed economies suffer fewer than 10 infant deaths per 1,000 live births, and their citizens have an average life expectancy of 75 years or more [53]. So we use 10% infant mortality rate and life length of 80 years old as criteria. Tables 8 and 9 show that the correlation coefficient between foreign trade and financial inclusion in developed countries which are both larger than those of developing countries. Therefore, there is sufficient reason to believe that Hypothesis 5 is robust.

4.4. Robustness Check. As a very common phenomenon in the financial field, if an economic variable is expected to accelerate or to slow down the growth of another variable, this intention only materializes later, with a certain time lag. Therefore, we set the first-order time lag value of foreign trade and financial stability as L. trade and L stability to test the robustness of Hypothesis 1 and Hypothesis 2. The findings of the fixed effect model are shown in Tables 10 and 11. The L. trade and lagged indices of financial stability are all statistically significant at the 1% level, implying that trade and financial stability do have a direct beneficial impact on financial inclusion.

4.5. Endogeneity Test. OBOR is more “global” in the sense that it engages “least developing countries” (LDCs) and bridges the gap between East and West, developed, and developing countries, and so has the potential to restructure the global communication system without resorting to economic, cultural, or ideological conflict [54]. It promotes

Table 5: Regression results between OBOR countries and non-OBOR countries.

|                          | IFI (OBOR countries) | IFI (non-OBOR countries) |
|--------------------------|----------------------|--------------------------|
| Foreign trade            | 0.004***             | 0.002***                 |
|                         | (5.236)              | (2.408)                  |
| Market capitalization of | 0.001***             | 0.001                    |
| listed domestic companies| (3.216)              | (1.523)                  |
| Inflation, consumer prices| 0.001***            | -0.010***                |
|                         | (3.323)              | (-5.041)                 |
| GDP per capita           | 0.000***             | 0.000**                  |
|                         | (10.255)             | (2.257)                  |

N: 1377; R²: 0.101 for OBOR countries; N: 731; R²: 0.051 for non-OBOR countries.

$t$ statistics in parentheses. $^* p < 0.1$, $^*_1 p < 0.05$, $^*_2 p < 0.01$. 
### Table 6: Regression results between developed and developing countries (I).

|                        | (1) IFI (developed countries) | (2) IFI (developing countries) |
|------------------------|-------------------------------|-------------------------------|
| Foreign trade          | 0.00541***                    | 0.00275***                    |
|                        | (6.93)                        | (3.81)                        |
| Market capitalization of listed domestic companies | 0.000741***                  | 0.0000851                     |
|                        | (3.38)                        | (0.17)                        |
| Inflation, consumer prices | -0.00159                     | 0.00103***                    |
|                        | (-1.47)                       | (4.01)                        |
| GDP per capita         | 0.00000406***                 | 0.000180***                   |
|                        | (3.79)                        | (19.25)                       |
| N                      | 1022                          | 1086                          |
| $R^2$                  | 0.073                         | 0.281                         |

$t$ statistics in parentheses. *$p<0.1$, **$p<0.05$, ***$p<0.01$. 

|                        | (1) IFI (developed country) | (2) IFI (developing country) |
|------------------------|----------------------------|----------------------------|
| Foreign trade          | 0.00491***                  | 0.00323***                  |
|                        | (5.56)                      | (4.94)                      |
| Market capitalization of listed domestic companies | 0.000242                   | 0.00148***                  |
|                        | (1.20)                      | (3.92)                      |
| Inflation, consumer prices | 0.00314                     | 0.000894***                 |
|                        | (1.23)                      | (3.41)                      |
| GDP per capita         | 0.000000803                  | 0.0000750***                |
|                        | (0.90)                      | (18.01)                     |
| N                      | 501                         | 1607                         |
| $R^2$                  | 0.079                       | 0.195                        |

$t$ statistics in parentheses. *$p<0.1$, **$p<0.05$, ***$p<0.01$. 

|                        | (1) IFI (developed country) | (2) IFI (developing country) |
|------------------------|----------------------------|----------------------------|
| Foreign trade          | 0.00466***                  | 0.00401***                  |
|                        | (6.12)                      | (5.63)                      |
| Market capitalization of listed domestic companies | 0.000328                   | 0.00144***                  |
|                        | (1.50)                      | (3.47)                      |
| Inflation, consumer prices | -0.00120                    | 0.000796***                 |
|                        | (-1.05)                     | (2.91)                      |
| GDP per capita         | 0.00000181*                 | 0.0000573***                |
|                        | (1.90)                      | (14.96)                     |
| N                      | 632                         | 1476                         |
| $R^2$                  | 0.070                       | 0.156                        |

$t$ statistics in parentheses. *$p<0.1$, **$p<0.05$, ***$p<0.01$. 

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unimpeded trade, which can reduce trade barriers and promote economic integration regionally. Since different countries joined the OBOR initiative at different phases, we use time-varying DID method to show the impact on financial inclusion under the shock of OBOR policy:

\[ IFI_{it} = \alpha_0 + \alpha_1 \text{OBORyear} + \alpha_2 \text{OBORcountry} + \alpha_3 D_{it} + \phi z_{it} + \epsilon_{it}, \]  

where \( i \) and \( t \) represent country and time, respectively; IFI indicates the extent to which financial inclusion has developed in different countries; \( D_{it} \) is a dummy variable that equals one in the years after the implementation of One Belt One Road policy and equals zero otherwise; OBORyear represents time effect and OBORcountry represents individual effect; \( z_{it} \) contains control variables; and \( \epsilon_{it} \) is the residual. The coefficient, \( \alpha_3 \), therefore indicates the impact of OBOR policy on financial inclusion. A positive and significant \( \alpha_3 \) suggests that the policy has a positive effect on financial inclusion, while a negative and significant \( \alpha_3 \) indicates that policy pushed inequality in access to financial services.

The dummy variable is significant at the 1% level, according to Table 12, and the correlation coefficient is 0.149, indicating that unimpeded trade promoted in the OBOR initiative improved financial inclusion. The degree of foreign trade is favorably connected with the development of financial inclusion. According to the news report, “Tariiff e Loan” is an online loan products which is newly launched by China CITIC Bank. It aims to provide inclusive financial type foreign trade enterprises automatic application on services of the RMB working capital loans, showing that trade and financial inclusion are inseparable.

### 4.5.1. Parallel Trend Test

We next examine the dynamics of the relation between financial inclusion and foreign trade in OBOR policy. We do this by including a series of dummy variables in the standard regression to trace out the year-by-year effects of the policy on the financial inclusion index:

\[ IFI_{it} = \alpha + \beta_1 D_{t-5} + \beta_2 D_{t-4} + \cdots + \beta_{11} D_{t-5} + \alpha_1 \text{OBORyear} + \alpha_2 \text{OBORcountry} + \phi z_{it} + \epsilon_{it}, \]

### Table 9: Regression results between developed and developing countries (IV).

|                               | (1) IFI (developed country) | (2) IFI (developing country) |
|-------------------------------|-----------------------------|-----------------------------|
| Foreign trade                 | 0.00483***                  | 0.00344***                  |
|                               | (2.75)                      | (5.54)                      |
|                               | 0.000102                    | 0.00112***                  |
|                               | (0.29)                      | (3.96)                      |
| Market capitalization of listed domestic companies | 0.00554 | 0.000694*** |
|                               | (1.20)                      | (2.59)                      |
| Inflation, consumer prices    | -0.000000132                | 0.0000248***                |
|                               | (-0.13)                     | (11.13)                     |
| GDP per capita                |                             |                             |
|                               | 213                         | 1895                        |
| \( R^2 \)                     | 0.059                       | 0.084                       |

\( t \) statistics in parentheses. \( * p < 0.1, ** p < 0.05, *** p < 0.01. \)

### Table 10: Regression results of lagged foreign trade and IFI.

|                               | (1) IFI                     |
|-------------------------------|----------------------------|
| L. trade                      | 0.00344***                  |
|                               | (5.76)                      |
| Market capitalization of listed domestic companies | 0.000904*** |
|                               | (3.57)                      |
| Inflation, consumer prices    | 0.000652**                  |
|                               | (2.57)                      |
| GDP per capita                | 0.00000979***               |
|                               | (6.59)                      |
| \( N \)                       | 1984                        |
| \( R^2 \)                     | 0.044                       |

\( t \) statistics in parentheses. \( * p < 0.1, ** p < 0.05, *** p < 0.01. \)
where the OBOR policy dummy variables, the “D’s,” equal zero, except as follows: $D_{j}^{-}$ equals one for countries in the $j$th year before the implementation of the policy, while $D_{j}^{+}$ equals one for countries in the $j$th year after OBOR policy; OBORcountry and OBORyear are vectors of dummy variables for country and year, respectively. At the end points, $D_{5}^{-}$ equals one for all years that are five or more years before policy, while $D_{5}^{+}$ equals one for all years that are five or more years after the policy. Thus, there is much greater variance for these end points, and the estimates may be measured with less precision [55].

Figure 1 plots the results and the 95% confidence intervals. The vertical coordinate is the policy dynamic effect. The horizontal coordinate is time point. Figure 1 illustrates a key point: After the implementation of One Belt One Road policy, foreign trade plays a more significant role in promoting financial inclusion. The coefficients on the dummy variables are insignificantly different from zero, while the prepolicy coefficient exhibited an upward trend. This significant fluctuation lasts for two years then approach to a flat. In the period from the third year to the fourth year after the implementation of the policy, this dynamic efficiency suddenly increases dramatically. The coefficient correlation approaches 0.2 and is significant at the 5% level, which verifies our Hypothesis 1 that foreign trade has great significance on financial inclusion.

4.5.2. Placebo Test. The placebo test is used to make the results more reliable. Its basic principle is similar to placebo in medical inspection, which uses “false policy time or group” to test whether the policy effect exists. If policy effect still exists, it means that the benchmark return the policy effect is not reliable. Further, the economic results may be caused by other factors cannot be observed but rather than focusing on policy. We can see from Figure 2 that the $p$ value is greater than 0.1 and the mean value of the estimated coefficient is close to 0, indicating that placebo has no significant effect on the dependent variable. That is to say, when the time of policy occurrence is changed, the effect of virtual DID is not significant. Our estimates are unlikely to have been accidental and thus unlikely to have been influenced by other policies or random factors. On the contrary, the estimates of the DID model are obvious outliers, which indicate that the results are reliable and verify the robustness of the regression results. The implementation of OBOR initiative has indeed had a positive impact on the development of financial inclusion in countries along the route.

| (1) | (2) | (3) |
|---|---|---|
| IFI | IFI | IFI |
| Bank capital to assets ratio | 0.0148*** | 0.00198*** |
| (15.89) | (12.75) | |
| Bank credit to deposits | 0.000832*** | 0.00113*** | 0.00105*** |
| (3.47) | (4.61) | (4.23) |
| NPLs to gross loans | 0.000804*** | 0.000725*** | 0.000685*** |
| (3.35) | (2.96) | (2.76) |
| Market capitalization of listed domestic companies | 0.0000339*** | 0.000103*** | 0.0000933*** |
| (2.35) | (7.17) | (6.42) |
| Inflation, consumer prices | 0.00000843*** | 0.0000103*** | 0.00000933*** |
| (2.49) | |
| GDP per capita | 1984 | 1984 | 1984 |
| N | 1984 | 1984 | 1984 |
| $R^2$ | 0.144 | 0.105 | 0.080 |

$t$ statistics in parentheses. $^* p<0.1$, $^** p<0.05$, $^*** p<0.01$. 

$\text{Table 12: The results of time-varying DID.}$

| (1) |
|---|
| IFI |
| post_year | 0.149*** |
| (5.43) |
| Market capitalization | 0.0000909* |
| (1.69) |
| Inflation consumer prices | 0.000489 |
| (0.84) |
| GDP per capita | 0.00000843*** |
| (2.49) |
| N | 2108 |
| $R^2$ | 0.089 |

$t$ statistics in parentheses. $^* p<0.1$, $^** p<0.05$, $^*** p<0.01$. 

Note: Table 11: Regression results of lagged financial stability and IFI. Table 12: The results of time-varying DID.
adequacy, and financial stability has an optimistic and significant impact on financial inclusion. In our study, capital adequacy is used as one of the indexes measuring financial stability.

There are more nuanced interlinkages between inclusion and the subdimensions of financial stability. While capital ratios show interlinkages to financial inclusion, low NPL ratios show significant positive correlations with greater inclusion in account ownership as well [14]. Then, the money supply has changed, and banks’ ability to lend has been affected, thus affecting financial inclusion. Therefore, a new viewpoint on fostering financial inclusion emerges. Conclusions recommend that one of the primary drivers of economy, foreign trade, can affect financial inclusion by changing bank structure to some extent. In addition to only focusing on the credit capacity of small and medium-sized enterprises, policymakers need to emphasize on foreign trade as well to maintain financial stability and procure financial inclusion development in the long run.

Furthermore, the economic impact of policies cannot be overlooked. As a strong economic policy, the OBOR initiatives could change the economic and political landscape of Asia, the most dynamic and economically vibrant region of the twenty-first century [60]. It announced that since the end of 2014, UnionPay card acceptance in Kazakhstan has been raised to nearly 60% [61]. This indicates that improving financial inclusion requires countries to increase foreign trade contacts, have closer cooperation, and greater progress.

Furthermore, because countries’ economic progress differs significantly in terms of trade, enhanced market access for developing countries will provide them with the means to use trade for development and poverty reduction [62]. Thus, Hypothesis 5 is also verified. The underlying mechanism may be investments in foreign subsidiaries and foreign currency convertible bonds issued by the banks constitute part of the bank’s structural position [63]. As developed countries have more robust banking structures and financial systems, their trade may have a more significant impact on the financial inclusion through this route. For developing countries, they should study the specific provisions of regional trade agreements led by other developed countries, strengthen communication and coordination with each other, and improve the development of foreign trade to further improve financial inclusion.

The limitations of this paper are as follows: First, the concepts of financial inclusion and financial stability have less clear border, and it is easy to confuse those two concepts. The second point is that this paper did not break down different regions geographically and culturally, and the impact of foreign trade in different regions geographically and culturally on financial inclusion may be different. The third point is that this paper only studied how foreign trade influence financial inclusion through financial stability, but the mechanism might be another way around. Above all, this study could be a starting point for further exploring the indicators affecting financial inclusion and the relationship among foreign trade, financial inclusion, and financial stability.

5. Conclusion and Discussion

This research clarifies the link between foreign trade, financial stability, and financial inclusion. First, most studies suggest that financial inclusion boosts foreign trade [56]. Third, the impact of foreign trade on financial stability acts as a transmission mechanism so that external shocks in one country will also spread to another [57], affecting the development of financial inclusion worldwide as well. However, there is very little empirical research on the relationship among foreign trade, financial stability, and financial inclusion. In contrast, this paper presents the trade-financial inclusion mechanism by introducing financial stability as a mediation factor. The points proposed are as follows.

First, this paper indicates that foreign trade can significantly improve the development of financial inclusion by 0.3% and the main regression results are robust. Foreign trade, a commercial activity, has for centuries influenced economic conditions and degree of financial inclusion [58]. We also take regression for financial inclusion index with one period lag of financial stability indexes, finding that the main results are still robust, which proves Hypothesis 2. More specifically, we try to make connections with Anarfo et al. [59]: Their study shows the interactive term of capital
Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.

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