
An empirical analysis on financial development and bilateral trade flow nexus.

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Abstract: This paper aims to analyze effect of the financial development level on bilateral trade flows of China and its trading partners, by the results are escorted with a panel data of 60 countries (china`s trading partners) under the period 2003-2017. The impact of financial development level on import and export flows of machine electronics, textile and machine transport products is estimated by employing random effects model, fixed effects model and Hausman-Taylor estimation methods. The results exhibit that China`s financial development has a negative effect on import flows, while it has positive and significant impact on exports of China. Additionally, it was found that financial development level of China`s trading partners is negatively correlated with textile exports of China. These results reveal that financial development level correlates differently with import and export flows.

Keywords: financial development, bilateral trade, random effects, fixed effects, textile products, machine electronics, machinery

INTRODUCTION

Most researchers have argued that financial development level plays a crucial role on international trade and give countries a more comparative advantage on bilateral with their trading partners(Do and Levchenko 2004, Vlachos 2005, Manova 2013, Gross and Verani 2013, Leibovici, and Szkup 2014). The question as to whether financial development has significant influence on international trade and stabile bilateral trade flows between trading countries, has been a matter of considerable attention and debate among economists. According to economic principles, financial development (FD) helps to accelerate FDI flows, capital allocation and facilitate institutional reforms (Beck, Levine, & Loayza, 2000). Indeed countries with high FD tend to engage in international trade with each other, and transactions between these economies are much easier and faster than lower FD countries.

While a large literature suggests that financial development fosters economic growth, considerably less research examines cross country effects of financial development on international trade. Indeed most of the papers that analysed FD and trade relationship could not give us clear evidence to obtain final conclusion. Famous researchers on this field Beck (2003) and Manova (2013) state that better financial markets may cause industries with high connection on outer finance to export more. Since there are strong correlations between level of entering to the external financial system and international trade at the firm level, most export decisions are impacted by financial frictions (Minetti and Zhu (2011) and Amiti and Weinstein (2011). Additionally, Kohn, Leibovici, and Szkup (2016) and Gross and Verani (2013), find, in their recent quantitative studies, that financial frictions are one of the troublemaking barriers to international trade, since they are an important factors of the dynamics of new exporters. Michel Cyrille Samba and Yu Yan (2003) by employing vector error correction model discovered that there is no consistent relationship between financial development and international trade in manufactured goods in Chinese economy. Their analysis backs the case up that a 1% increase in the level of domestic credit to private sector by banks and other financial institutions as a share of GDP produces a 2.7% increase in the trade balance of manufactured goods. One can obtain some notion from the principles stated above a pure, efficient, well developed and competitive financial sector should be in the interests of all countries.

This paper analyses FD and bilateral trade relationship between China and its trading partners covering the period 2003-2017. Specifically, this aims to answer following questions:

1) Does financial development level impact on bilateral trade growth rate?

1a) Does financial development level effect differently on import and export flows?

This paper aims to answer aforementioned questions empirically and attempts to shed some light on the roles of FD as a main explanatory variable and in addition other variables in measurement of bilateral trade flows.

This paper is highly important, since it studies the impact of financial development level on bilateral trade flows at product groups, very few studies have done such kind of empirical research before. Additionally, it seeks to fill in the gaps in the literature of the observed field.

The current paper is organized as follows. Section 2 represents a brief review of existing literature linked to the financial development-trade nexus. Section 3 describes data specification, and employed econometric models and empirical tests. Section 4 presents empirical results, and discussion of the current study and section 5 concludes the whole paper.

LITERATURE REVIEW

Some researchers studied FD's impact on foreign trade, while others observed the role of foreign trade on the development of financial sectors. Hence, we can divide our literature review into two parts. First part is FD to foreign trade, and second part is foreign trade to FD. Kletzer and Bardhan (1987), Baldwin (1989), Rajan and Zingales (1998, 2003), Omran and Bolbol (2003), Svaleryd and Vlachos (2005), Do and Levchenko (2004), Kohn, Leibovici, and Szkup (2014) and Gross and Verani (2013) Niepman and Schmidt-Eisenlohr, (2017), Manova et al., (2015), Piermartini, R. and Yotov, Y., (2016) investigated FD's influence on trade and got different results, yet most of them found that significant and positive relationship between them. For instance, Kletzer and Bardhan (1987) argue that economies with a relatively advanced financial system may experience a comparative advantage in industries and sectors that counted on exoteric finance. Baldwin (1989) is one of the most eminent researchers who created first models in that financial markets are source of comparative advantage in foreign trade. In his model he proved that well-developed financial markets have better options of diversifying risk caused by demand shocks, therefore, firms producing the risky products face lower risk premium and marginal costs. He states that economies with advanced financial markets and as a result of diverseness possibilities specialize to produce risky products. Differences in reliance on external finance are expected to act mutually with cross-country variation in FD serves as a basis of comparative advantage on trade Rajan and Zingales (1998). Svaleryd and Vlachos (2005) found that an advanced financial system may promote more savings to the private sector, thus may facilitate enterprises to employ outer financing and therefore help firms overcome liquidity problems. Beck (2003) and Manova (2013) state that better financial markets may cause industries with high connection on outer finance to exporting more. Following Omran and Bolbol (2003) a well-developed domestic financial sector promotes increasing the foreign firm's borrowing to diversify their innovative activities in the domestic economy. Hur et al. (2006) studied the FD and foreign trade nexus for 27 industries in 42 countries on the basis level of incorporeal and corporeal assets. Their results exhibit that, the industries with more incorporeal assets gets more benefits from level of FD than industries with corporeal assets. FD level spurs exports and provides trade balance those industries. Susanto et al. (2011) studied the correlation between FD and bilateral trade flows, and concluded that there is positive influence of FD on mutual trade flows. Indeed, that effect is more outstanding in manufacturing sector, with mostly large economies. Additionally, based on her research, export rate is more affected by FD in developing economies than developed one. Goksel (2012), states that, countries with distinct financial systems and levels may face problems on bilateral trade, furthermore, financial constraints negatively effect on country's export performance. So that, economies with relatively healthier financial markets experience higher bilateral trade levels with each other. Based on the results of his empirical research, domestic firms need substantial amount of credit to cover their costs, thus FD emboldens the export scale of a country by improving capital allocation and mobilizing savings. Manova (2015) states that more advanced financial markets provide domestic industries with a higher reliance on external finance in exporting more. Following Kohn, Leibovici, and Szkup (2014) and Gross and Verani (2013), find, in their recent quantitative studies, that financial frictions are one of the troublemaking barriers to global trade, since they are very important factors of the dynamics of new exporters. Korhan et al. (2015), investigate importance of FD on foreign trade, his empirical findings reveal that the industries that have a more reliance on external financing, may have possible degree of comparative advantage on foreign trade through FD level. Such kind of industries are tending to have bigger shares of exports, and they likely get more benefits on global trade in economies which experience higher FD level. Even though, most of the researches displayed the significance of FD on trade, some empirical studies found opposite relationship between them. According to Awojobi (2013) FD does not stimulate trade in Greece. Conversely, trade openness has unidirectional causality to FD. He states that FD and trade nexus is only demand-driven. Nevertheless, FD can stimulate trade only through indirect manner, firstly FD spurs economic growth, and economic growth leads trade openness. But this hypothesis does not applicable for every country, since countries differ from each other according to their economic size, FD level and trade volumes.

The second volume of researchers such as and Zingales(2003), Do and Levchenko(2007), Mishkin(2009), Baltagi et al. (2009), Kim, Lin and Suen (2010), Amiti and Weinstein (2011) Kiendrebeogo (2012), Alagidede and Ibrahim (2016), Assefa and Mollick (2017) studied in their recent papers impact of foreign trade on FD of economies. Most theories developed by those researchers prove that there is positive nexus between trade and FD, yet there are some contrast ideas about the significance of the affect foreign trade on FD. It s known that most developing countries to set a bunch of trade barriers on imports of foreign products, in order to prevent domestic firms from negative hindrances of exports. Furthermore, governments should provide their domestic firms with financial support, so that firms can get a comparative advantage in international area. As a result those financial aids impacts productivity and investment policy of producers, additionally, firms obtain pricing dominance in foreign trade. On this point of view financial well-being of the economies may effect on their trade volumes. Yet, on the demand — driven side FD is provoked by foreign trade Mishkin (2009). Here Mishkin(2009) deeply analyzed foreign trade and FD nexus and gave further details about this field. Additionally, Samba and Yu Yan (2003) by employing vector error correction model discovered that there is no consistent relationship between FD and foreign trade in manufactured goods in Chinese economy. Their analysis backs the case up that a 1% increment in the level of domestic credit to private sector by banks and other financial institutions as a share of GDP produces a 2.7% increment in the trade balance of manufactured goods. Kim, Lin and Suen (2010) analyzed the effect of foreign trade on FD of the countries based on income levels and inflation, and concluded that relationship between foreign trade and FD may be country specific in long-run and short-run effects. The influence of foreign trade on the FD maybe positive in the long term, yet negative in the short term in low income economies, while trade has negative long term and significant short term effects on FD of developed countries. Samba and Yan (2010) studied the foreign trade and FD nexus in selected East Asian Countries, and concluded that foreign trade stimulates FD in observed countries. On the other hand they got identical outputs with Kim et al. (2010). Additionally, Kiendrebeogo (2012) studied the nexus FD with foreign trade for both developed and developing countries under the time period 1961-2010. According to his research results there is a bidirectional nexus between FD and foreign trade. He states that because of different FD level, the causality indicates different degrees between developed and developing economies. According to Rajan and Zingales(2003) or Do and Levchenko(2007) development of finance system a country accelerated by financial needs of the entrepreneurs under pressure of comparative advantage in foreign trade. The empirical results obtained by Law et al. (2006), observing developing countries, concluded that opening up capital accounts and trade positively influence on FD, by confirming Rajan and Zingales(2003) hypothesis. But Law warns that his discoveries should be explained with careful attention, since the countries are, in his sample size, mostly developing countries, and in these countries banking sector is the key driver of financial sector. Amiti and Weinstein (2011) proved by their empirical results, there is a connection between access to external finance and foreign trade at the firm level. Baltagi et al. (2009), state that foreign trade and financial openness may strongly effect on FD. They analyzed trivalent link among trade, FD and growth, and concluded that there is a significant relationship between finance and trade, trade and growth, and finance and growth connections. Even though lots of studies and investigations have been done on FD and foreign trade nexus, most of the researchers focused only on country or industry level. Thus, there is a gap in the literature about cross-country relationship of FD and foreign trade. This paper aims to fill the gap and add small share to develop this field.

MATERIALS AND METHODS

The data

This paper based on panel data of total 60 trading partners of China(Appendix B), all data is secondary data and taken from World Integrated Trade Solution (WITS) organization, the World Bank (WB) and International Monetary Fund (IMF) national accounts data files covering the period from 2003 to 2017, which is informed by panel data and highly balanced(Appendix A). The identifier, definition, and source of the data are showed in Appendix A.

Model specification

Jan Tinbergen (1962) applied Isaac Newton`s one of the most famous physical theories gravitational theory into international trade. The bilateral trade between countries is positively related to economic size of two countries, but inversely related to distance. After introduction into international trade, gravity model soon became popular among economists and was employed by lots of researchers with different independent variables. The functional form of the gravity model, that is commonly employed in economic research illustrated in (1)

$$Y_{abt} = G \frac{X_{at} X_{bt}}{D_{ab}} \quad (1)$$

let Y_{abt} —denotes bilateral trade flows between countries a and b, at time t (sum of their exports and imports), X_{at}, X_{bt} — economic size of countries, at time t, (GDP of, respectively, countries a and b), D_{ab} corresponds — geographic distance between countries a and b, G is gravitational constant term. This standard formulation of the model states that larger economies tend to trade more than smaller ones, and distance (transaction costs) reduces trade volume. As mentioned above various researchers (see Feenstra, Markusen, and Rose (1999), Anderson (1979), or Anderson and van Wincoop(2003), Martínez-Zarzoso and Nowak Lehmann (2004),

Piermartini, R. and Yotov, Y., 2016) extended this model by including new different factors, for instance, membership in monetary, economic, and/or political unions, common language, common border, and historical colonial membership, culture and so on. Jeffrey Frankel (1997) introduced, one of the most forestanding examples of Gravity Model application late XX century. Other extended modifications the explained (LHS) variable to adapt the model to analyze other situations, such as international migration, FDI flows, environmental damage, or tourist flows.

$$Y_{abt} = \beta_0 X_{at}^{\beta_1} X_{bt}^{\beta_2} D_{ab}^{\beta_3} \quad (2)$$

Here Y_{ab} illustrates trade volume between countries $a=1, \dots, n$ and $b=1, \dots, n$ (with $a \neq b$), measured as export flows from country a to country b . Total number of observations that is usually written as $n(n-1)$, can be denoted by N , in order to make convenience for writing formulas. In its traditional form of gravity equation Y_{ab} corresponds bilateral trade volume between country a and country b , at time t . According to, basic theory of gravity model Y_{ab} is positively related to the economic mass (GDP) of two countries, marked by X_a and X_b , but negatively related to a distance deterrence function or power function, which illustrates distance, D_{ab} , between country a and b . $\beta_0, \beta_1, \beta_2$ and β_3 are unknown parameters.

The stochastic form of the gravity model's equation can be displayed as below:

$$Y_{abt} = \beta_0 X_{at}^{\beta_1} X_{bt}^{\beta_2} D_{ab}^{\beta_3} \theta_{ab} \quad (3)$$

Where, θ_{ab} denotes a disturbance or error term with $E[\theta_{ab} | X_a, X_b, D_{ab}] = 1$, supposed not to be statistically dependent on the explanatory variables X_a, X_b and D_{ab} . From this assumption, one can make this equation:

$$E[Y_{ab} | X_a, X_b, D_{ab}] = \beta_0 X_{at}^{\beta_1} X_{bt}^{\beta_2} D_{ab}^{\beta_3} \quad (4)$$

The most widespread way of solving equation (3) is a log-log transformation dispersing and at last calculating unknown parameters by using ordinary least squares (OLS).

Our econometric model based on selected variables expressed as:

$$BT_{abt} = B_0 GDP_{at}^{\beta_1 a} GDPCH_{bt}^{\beta_2 b} FDP_{at}^{\beta_3 a} FDCH_{bt}^{\beta_4 b} LLCD_a^{\beta_5 a} Dist_{ab}^{\beta_6 ab} REER_{abt}^{\beta_7 ab} DGDPP_{abt}^{\beta_8 a} TOCH_{bt}^{\beta_9 b} FTA_{ab}^{\beta_{10} ab} \theta_t \quad (5)$$

In order to reduce heteroscedasticity level Eq. (1) was transformed into logarithmic form:

$$BT_{abt} = \beta_0 + \beta_1 \ln(LGDP_{at}) + \beta_2 \ln(LGDPCH_{bt}) + \beta_3 \ln(LFDCH_{bt}) + \beta_4 \ln(LFDP_{at}) + \beta_5 \ln(LFDCH_{bt}) + \beta_6 \ln(LLCD_a) + \beta_7 \ln(Dist_{ab}) + \beta_8 \ln(LREER_{abt}) + \beta_9 \ln(FTA_{ab}) + \beta_{10} \ln(LDGDPP_{abt}) + \beta_{11} \ln(LTOCH_{bt}) + \theta_t \quad (6)$$

Here $\beta_0 = \log(B_0)$ natural logarithm of constant term subscripts a and b shed light on China's trading partners and China respectively, and t represents the time period.

BT_{abt} is dependent variable which includes import and export flows of machine transport, textile and machine electronics products;

$LGDPCH_{bt}$ and $LGDP_{at}$ explain GDP per capita China and its trading partners respectively;

$DGDPP_{ab}$ represents difference between income levels of partner economies, the calculation method specification follows as:

$$DGDPC_{ab} = 1 + |w \ln w + (1 - w) \ln(1 - w)| / \ln 2 \quad (7)$$

Where w stands for difference GDPP ratios between country a , and partner country b :

$$w = \frac{GDP_a}{GDP_a + GDP_b} \quad (8)$$

$LFDCH_{bt}$, and $LFDP_{at}$ indicate the financial development level of countries a and b , respectively, in period t .

In order to calculate level of financial development of countries we follow International Monetary Fund (IMF) guidelines for measure FD Svirydzhenka (2016). On the way of measuring FD nine indices should be developed, these indices constructed as six lower level sub-indices which represents financial institutions depth (FID), financial institutions access (FIA), financial institutions efficiency (FIE), and financial markets depth (FMD), financial markets access (FMA), financial markets efficiency (FME), and two upper sub-indices stands for showing development of financial institutions (FI) financial markets (FM), calculation formula for FI and FM indices follows as:

$$FI_j = \sum_{i=1}^n \omega_i I_i \quad (9) \text{ and } FM_j = \sum_{i=1}^n \omega_i I_i \quad (10)$$

here ω_i and I_i stand for weights of linear average and transformed continued indicators (between 0-1) of the lower sub-indices. After that process produced sub-indices will be summed up upper level indices FI and FM by following the same method as mentioned above:

$$FI = \sum_{i=1}^n \omega_i FI_j \quad (11) \quad FM = \sum_{i=1}^n \omega_i FM_j \quad (12)$$

Finally middle sub-indices FI and FM are brought together to measure total level of financial development FD.

$$FD = \omega_{FI} FI + \omega_{FM} FM \quad (13)$$

One should notice here that FD index must range between 0 and 1, therefore the indices illustrated above FI, FM, and FD were renormalized.

$LLCD_a$ is a dummy variable and set equal to 1 for landlocked countries, and 0 for the countries accessible for seaways;

$DIST_{ab}$ is the great-circle distance between countries a and b , data is retrieved from CEPII's database, and measures use city-level data to assess the geographic distribution of population inside each nation. The distance formula employed is a generalized mean of city-to-city bilateral distances developed by (Head et al., 2010; Head and Mayer, 2013); which takes the arithmetic mean and the harmonic means as special cases;

$LTOCH_{bt}$ is a measurement for trade openness of China, sum of export and import flows as a percentage of GDP;

$LREER_{abt}$ denotes the real exchange rate between countries a and b : The real exchange rate between two countries is calculated by the nominal exchange rate multiplies by the GDP deflator. r_{abt} : the nominal exchange rate of country a and the other countries in partner country b . DEF_a and DEF_b GDP deflators of China and its partner countries.

$$LREER_{abt} = r_{abt} \frac{DEF_a}{DEF_b} \quad (12)$$

¹ For detailed information about eq.(12) see Ha Minh NGUYEN, Binh Quoc Minh QUAN, Huong Van LE, Thinh Van TRAN / Journal of Asian Finance, Economics and Business Vol 7 No 1 (2020) 123-129

FTA_{ab} is a binary variable indicating that whether or not both partners have Free trade agreements, if yes 1, otherwise 0;

$\beta_1 \beta_2 \beta_3 \beta_4 \beta_5 \beta_6 \beta_7 \beta_8, \beta_9 \beta_{10}$ and β_{11} illustrates the elasticity of independent variables; θ_t is error term.

The Econometric Methodology

The model estimation is carried out on panel data, since panel data is more efficient in studying the dynamics of change, it provides more informative data, and variability, less collinearity among variables, more degrees of freedom and more efficiency compared to cross sectional or time series data (D. Gujarati and D. Porter 2009). Egger (2000) finds out that panel data is the most peculiar approach for freeing up time-invariant and country-specific effects.

Different estimators such as fixed effects model (FEM), random effects model (REM), generalized method of moments (GMM) and Hausmann-Taylor (HT) have been employed to estimate log transformation of gravity model. This paper applies fixed effects model (FEM) and random effects model (REM) with Hausmann-Taylor (HT). Below presented briefly notions about these approaches and explanation why these models are used jointly. Under the assumption of no correlation of unobserved characteristics with all of explanatory variables REM creates biased and inconsistent outputs, in order to eliminate this correlation FEM would be preferred, though a correlation occurs between unobserved parameters and all independent variables FEM provides unbiased and consistent estimations, because within estimator employs de-meaned variables which are estimated by subtracting sample mean values from their individual values of these variables (D. Gujarati and D. Porter 2009). Hausman and Taylor (1981) panel data estimator hereafter (HT) solves this problem by using instrumental variables method. Since HT recaptures the impact of constant variables, and permits the possible correlation between independent variables and error term in the model, by these methods HT fulfills shortcomings of FEM and REM.

Hypothesis

In order to answer research questions we build one main and two sub hypothesis:

Main hypothesis: China's financial development accelerates its bilateral trade flows

Sub hypothesis: Financial development level positively impacts on export flows

Sub hypothesis: Financial development level negatively effects on import flows

RESULTS AND DISCUSSIONS

Table-1 and **2** present estimation results of gravity equation, where dependent variables are import flows of Machine electronics (IMPMACHEL), Textile (IMPTEXTILE) and Machine Transport (IMPMACHTRANS) and export flows of Machine electronics (EXPMACHEL), Textile (EXPTEXTILE) and Machine Transport (EXPMACHTRANS) products. According to Eq. 6, dependent variables are regressed on all explanatory variables with REM, FEM and HT estimation methods. All estimation outputs show expected results, which are identical with results of previous researches. It can be seen from **Table-1** and **2** results of FEM and HT estimation methods are almost identical, while results of REM are slightly different. It reveals that REM is producing biased results under assumption of no correlation between error term and independent variables, thereupon results of REM and FEM will be explained according to Hausman test. The results of Hausman test in **Table (1)** proved that variables with IMPMACHTRANS (0.0112) in REM are correlated with disturbance term, consequently, the null hypothesis is rejected and concluded that FEM is suitable for analyzing of import flows of machine transport products. In **Table (2)** results of Hausman test rejects null hypothesis and approve that FEM model is suitable for analyzing EXPMACHTRANS (0.0150) and EXPMACHEL (0.0016) and financial development nexus. Additionally, time invariant variables are expounded by both REM and HT results, hence

FEM can't estimate impact of fixed variables on the model. In order to prevent estimation results form, problems such as collinearity and heteroscedasticity we run our empirical analyses with robust options.

Table 1: The results of FEM, REM, and HT estimations with import flows

	RE			FE			HT		
	IMPM ACHE L	IMPTE XTILE	IMPMAC HTRANS	IMPM ACHE L	IMPTE XTILE	IMPMAC HTRANS	IMPM ACHE L	IMPTE XTILE	IMPMAC HTRANS
LFDP	1.533 (0.794)	1.045 (0.559)	1.474 (0.777)	0.933 (0.865)	0.268 (0.673)	0.860 (0.848)	0.934** (0.342)	0.269 (0.363)	0.862** (0.331)
LFDC H	-0.0351 (0.898)	-1.255 (0.865)	-0.386 (0.920)	-0.103 (0.873)	-1.161 (0.949)	-0.399 (0.886)	-0.102 (0.772)	-1.157 (0.821)	-0.397 (0.749)
LGD PP	0.785 (0.432)	-0.181 (0.383)	0.659 (0.463)	0.305 (0.444)	-0.496 (0.503)	0.157 (0.475)	0.307 (0.228)	-0.490* (0.237)	0.162 (0.218)
LGD PCH	0.465 (0.340)	1.326*** (0.257)	0.528 (0.342)	0.850* (0.339)	1.583*** (0.370)	0.917** (0.341)	0.849*** (0.237)	1.578*** (0.249)	0.913*** (0.228)
PCII	-0.957 (1.188)	-1.194 (1.018)	-0.550 (1.179)	-1.167 (1.291)	-1.178 (1.140)	-0.867 (1.288)	-1.169* (0.465)	-1.181* (0.480)	-0.869* (0.443)
LREE R	0.0125 (0.188)	-0.0431 (0.197)	0.0151 (0.205)	0.175 (0.203)	0.0871 (0.273)	0.140 (0.230)	0.174* (0.0720)	0.0848 (0.0767)	0.138* (0.0697)
LTO CH	-0.289 (0.387)	0.879* (0.361)	-0.427 (0.395)	0.300 (0.494)	1.363* (0.613)	0.131 (0.502)	0.297 (0.353)	1.356*** (0.374)	0.126 (0.342)
LDIS T	-1.510* (0.695)	-1.136** (0.403)	-1.105 (0.732)	0 (.)	0 (.)	0 (.)	5.749 (11.05)	3.021 (8.453)	2.702 (8.161)
LLC D	-4.108* (1.674)	-0.934 (0.605)	-4.435* (1.916)	0 (.)	0 (.)	0 (.)	-4.998 (11.20)	-1.649 (8.843)	-4.989 (11.01)
FTA	1.856 (1.008)	1.442* (0.597)	1.425 (1.029)	0 (.)	0 (.)	0 (.)	27.27 (38.63)	15.70 (29.24)	14.07 (26.78)
_cons	17.04* (7.455)	9.738 (7.138)	14.14 (8.038)	1.804 (5.982)	-2.443 (6.413)	3.017 (6.489)	-56.05 (107.4)	-33.24 (82.15)	-24.36 (78.64)
Hausman Prob> chi2	0.9953	0.4235				0.0112			
N	896	896	899	896	896	899	896	896	899

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results of FEM, REM and HT indicate that partner's financial development level (LFDP) has positive but insignificant relationship with import flows of IMPMACHEL, IMPTEXTILE and IMPMACHTRANS (**Table-1**). Aforementioned results perfectly support economic doctrines, since China's import flows are partner countries' export flows therefore, a percent increase in partner countries' financial development accelerates import flows of China. On the export side, LFDP has illustrated positive and powerful impact on export flows of machine electronics and machine transport products, whilst it influences negatively on textile exports. Only, HT shows that partner countries financial development affects contradictory and with strong explanatory power on textile exports (EXTEXTILE) (see **Table-2**). Becker and Greenberg (2003, 2007) state that countries with better financial development export more, hence finance has a better positive influence on exports in sectors that are based more on advertising and R&D.

In line with previous literature, China's financial development (LFDCH) has also indicated expected signs. Results of fixed effects model and Hausman-Taylor estimation methods show that, impact of LFDCH on import flows negative but insignificant (see **Table 1**). As we expected, **Table (2)** illustrates that the coefficients of LFDCH positive and significantly associated with export flows of Machine electronics (EXMACHEL), and Machine Transport (EXMACHTRANS) products, the estimation outcomes same for all three models, yet only the relationship between LFDCH and textile exports is not powerful. It gives assumption that any percent increase of China's financial development level increases its exports. The overall impacts of financial development of China seem to be sufficiently different between exports and imports. The results follow completely with previous literature (Manova 2005, 2006, Beck 2002, 2003, Do and Levchenko 2004), since most of them stated that financial development has a positive and significant impact on exports. According to

Susanto et al. (2011) development financial systems accelerates export flows of developing countries rather than that of developed countries.

Table 2: The results of FEM, REM, and HT estimations with export flows

	RE			FE			HT		
	EXMA CHEL	EXTE XTILE	EXMACH TRANS	EXMA CHEL	EXTE XTILE	EXMACH TRANS	EXMA CHEL	EXTE XTILE	EXMACH TRANS
LFDP	0.683*** (0.132)	-0.161 (0.274)	0.662*** (0.135)	0.702*** (0.139)	-0.300 (0.309)	0.698*** (0.143)	0.702*** (0.0789)	-0.294* (0.126)	0.698*** (0.0809)
LFDC H	0.600*** (0.155)	0.276 (0.272)	0.601*** (0.179)	0.638*** (0.159)	0.356 (0.278)	0.647*** (0.182)	0.638*** (0.179)	0.362 (0.287)	0.646*** (0.183)
LGDP P	0.594*** (0.105)	0.439** (0.159)	0.668*** (0.100)	0.680*** (0.122)	0.477* (0.225)	0.782*** (0.116)	0.680*** (0.0517)	0.489** (0.0781)	0.782*** (0.0529)
LGDP CH	0.869*** (0.0820)	0.841** (0.121)	0.840*** (0.0835)	0.805*** (0.0910)	0.817** (0.161)	0.755*** (0.0916)	0.806*** (0.0543)	0.808** (0.0848)	0.756*** (0.0557)
PCII	-0.653* (0.301)	-0.733 (0.409)	-0.471 (0.293)	-0.616* (0.302)	-0.726 (0.464)	-0.415 (0.289)	- 0.616*** (0.105)	- 0.729** (0.168)	-0.414*** (0.107)
LREE R	0.0362 (0.0260)	0.0135 (0.0429)	0.0475 (0.0254)	0.0170 (0.0273)	0.0078 (0.0604)	0.0230 (0.0256)	0.0173 (0.0166)	0.0037 (0.0250)	0.0233 (0.0171)
LTOC H	0.878*** (0.109)	0.693** (0.134)	0.960*** (0.119)	0.797*** (0.114)	0.684** (0.173)	0.853*** (0.125)	0.798*** (0.0813)	0.670** (0.127)	0.854*** (0.0833)
LDIS T	-0.629** (0.236)	- 0.753** (0.190)	-0.620** (0.234)	0 (.)	0 (.)	0 (.)	-2.074 (2.401)	- 1.415** (0.415)	-2.111 (2.686)
LLCD	-2.086** (0.783)	- 2.283** (0.244)	-1.986** (0.766)	0 (.)	0 (.)	0 (.)	-1.972 (3.396)	- 2.262** (0.567)	-1.859 (3.800)
FTA	0.237 (0.324)	0.164 (0.256)	0.220 (0.333)	0 (.)	0 (.)	0 (.)	-4.864 (7.758)	-2.134 (1.311)	-4.972 (8.679)
_cons	6.183** (2.352)	8.272** (2.123)	5.143* (2.375)	0.709 (0.918)	1.379 (1.765)	-0.213 (0.887)	20.44 (23.07)	14.63** (4.174)	19.87 (25.81)
Hauss mann Prob> chi2		0.0523		0.0150		0.0016			
N	900	900	900	900	900	900	900	900	900

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

All models show that the overall bilateral country sizes LGDPP and LGDPCH have different influences on amount of import and export flows between China and its trading partners. REM and FEM estimations illustrate LGDPP has showed decisive influence on import flows of machine electronics and machine transport products, while its impact on textile imports is negative (see **Table-1**). In **Table (2)** one can witness that, LGDPP shows positive and powerful nexus with all dependent variables. FEM and REM results illustrated that China's GDP per capita growth has significant impact on growth of export flows all observed products between China and its

trading partners. Whilst, LGDPCH showed positive and significant influences, at different significance levels, on import flows machine electronics and textile products between China and partner country, with all estimation methods.

REM reveals that the coefficients of LTOCH are negative for Machine electronics and Machine Transport imports, but it has positive effect on Textile products imports with 5 percent significance level. However, FEM and HT models proved that the influence of LTOCH on IMPMACHEL, IMPTEXTILE and IMPMACHTRANS is positive yet only significant with IMPTEXTILE. The results in **Table (2)** exhibits that, the coefficients of LTOCH are positive and statistically significant, proposing that higher degree of trade openness of China is associated with higher level of export flows. It is theoretically and empirically proved that trade openness has an impact on international trade, since it creates a competitive environment for countries to diversify sorts and improve the quality of the goods to increase in their export and import flows (Ravallion, 2004). Depending on their product capacity entrepreneurs may prefer to produce goods for domestic consumers or to pay extra costs for entering international markets. Along with, trade openness leads to increase a country's export flows by eliminating trade cutoffs and promoting the propensity of producers Melitz (2003). According to Do and Levchenko (2004), openness to trade influences diversely on the trade flows of countries and this causality depends on the development level of the countries. They argue that trade openness directly impacts on demand for external finance, as well as financial development in trading partners. For instance, if financially developed and financially poor countries trade with each other, developed countries focus on producing the financially dependent good, since they have comparative advantage in finance, as a result their financial system will deepen. On the other hand, financial dependent sector of the poor country shrink, consequently, both the size and quality of the whole financial sector will decrease. Undoubtedly, this will result in losses from international trade to the poor country.

Per capita income inequality (PCII), as expected, negatively influencing on both bilateral import and export flows between China and its trading partners. The results completely matches with Linder(1961) hypothesis, which states that, countries with less income gap trade more with each other or vice-versa.

All models demonstrate that, difference between real exchange rate of trading partners(LREER) presents positive coefficients, that is unexpected result, but insignificantly impact on dependent variables, while HT results points out that difference between exchange rates has positive and significant (at 5 percent significance level) impact on IMPMACHEL and IMPMACHTRANS **Table (1)**. Along with previous results LREER presented positive but insignificant affect on export flows. Becker and Greenberg (2003, 2007) obtained through their empirical investigations that export flows are less elastic in exchange rate fluctuations in financially developing economies. But import flows are more responsive to exchange rate fluctuations in high financial developed countries. The authors concluded that this influence is higher in differentiated products than undifferentiated products.

Time invariant variables like distance (LDIST) and free trade agreements (FTA) are important, though main variables are LFDP and LFDCH, variables in the model since they explain better the size of bilateral trade flows. The results of both REM in **Table (1)** indicate that the marginal impacts of LDIST, which is usually referred to as the elasticity of trade volume with respect to distance, on the IMPMACHEL, IMPTEXTILE and IMPMACHTRANS are negatively related. In contrast HT results revealed positive yet insignificant results on import flows.

Along with random effects model and HT outputs, LDIST has contradictory and significant correlation with all explained variables with respect to export flows, yet REM illustrated that LDIST has significant impact on IMPMACHEL and IMPTEXTILE (see Table-2). Obviously the results prove that, bilateral distance reduces import flows more proportionately in machine transport and textile, than proportionately in the machine transport products. The obtained results are consistent with the previous studies (Leamer 1993, Disdier and Head (2008), Frankel (1997), Soloaga and Winters (2001), Berthelon and Freund (2008)) which is also investigated contradictory influence of distance on bilateral trade flows. Some authors argue that a little change in the trade adaptability to distance Leamer (1993). Researchers such as Frankel (1997), Soloaga and Winters (2001), Berthelon and Freund (2008), found an increasing distance impact, in line with Felbermayr and Kohler (2006) findings, growth of distance influence is the result of omitting the extensive margin of trade. Finally, Berthelon and Freund (2008) state that the increase of the total distance influence is by the consequence of the changes of distance coefficients through industries. Similarly, REM and HT estimation results exhibit that, the geographical distance variable DIST has contradictory and significant correlation with the independent variables. The previous studies (Boisso and Ferrantino (1993), Eichengreen and Irwin (1998), Brun et al. (2005), Felbermayr and Kohler (2006), Coe et al. (2007)) observed and found a growth of contradictory influence of the distance on trade flows over time. In contrast, there are several possible conclusions for these contradictory results. For instance, Brun et al. (2005) stated that infrastructure is an important factor for the decline of the distance influence.

According to REM estimation results, LLCD has negative and significant relationship with Machine electronics and Machine transport imports. Negative impact of being landlocked of partner countries on international trade

follows the results of previous literatures (Radelet and Sachs 1998, Gallup et al. 1999, MacKellar 2000, Limao and Venables 2001, Raballand 2003). Indeed coefficient of geographic landlocked variable LLCD has a negative effect and illustrates strong explanatory power with the magnitude of -2.086, -2.283 and -1.986 in machine electronics, textile and machine transport export flows, respectively. Based on previous researchers, variable of being being landlocked reduces trade flows by more than 80% Raballand (2003).

REM and HT exhibit that the marginal influences of FTA on IMPMACHEL, IMPTEXTILE and IMPMACHTRANS are positive, on the basis of random effects model and Hausman-Taylor, free trade agreements has positive and significant influence on textile imports, but with machine electronics and machine transport imports only positive not significant **Table(1)** columns 1 and 3. The coefficient of free trade agreements variable has positive but insignificant impact on China's exports flows. Furthermore, one can conclude that, FTA does not have strong influence on exporting Machine electronics, Textile and Machine Transport products (see Table-3). This positive and significant relationship have been proved in many previous literatures, for instance Frankel (1997) studied the influence of regional economic integration on trade flows and concluded that there is positive relationship between bilateral trade flows and free trade agreements. Garman (1999) tried to measure the impact of various forms of economic agreements on intra-regional trade flows within Latin American countries and found positive correlation between free trade agreements and trade flows.

CONCLUSION

This paper analyzed the impact of financial development level on import and export flows of machine electronics, textile and machine transport products between China and its trading partners. The panel data is strongly balanced and covers the period 2003-2017, it can be seen that the analyzed period is long enough therefore, it is natural that the model may face problems such as collinearity and heteroscedasticity. In order to prevent the model from such mentioned problems, different estimation methods like random effects model, fixed effects model and Hausmann-Taylor models are employed with robust options. The results suggest that both export-import flows are responsive to changes in financial development. Even though insignificantly, a point increment in China's financial development decreases its import flows, yet partner countries' financial development level positively impacts on bilateral import flows, here partner countries plays as exporter role to China. According to, international trade principles, financial development level accelerates a country's export flows (Manova 2005, 2006, Manova et al, (2015) Beck 2002), through creating beneficial and reliable environment for both producers and investors. Unquestionably, FD increases business' dependency on foreign capital but it brings a chance to accomplish big projects which demands more financial aid. Another expected result is China's financial development level positively and significantly correlated with its export flows, yet without strong explanatory power with textile exports. Evidence suggests that China transformed itself from textile importer country to textile exporter country during the observed period (Appendix C). In the view of export flows and financial development nexus findings, it can be stated that both LFDP and LFDCH have positive and significant correlation with export flows of China. Obviously relationship is export dominant here due to China's active export policy.

On the basis of empirical findings, it is concluded that bilateral trade and FD nexus maybe import-dominant or export-dominant Vlatka et al. (2017). When a country consumes more imported products relationship between FD and import flows is positive otherwise vice versa. In observed case, export and FD nexus is positive and significant, since China is one of the export dominant countries in the world.

Additionally, one can conclude based on obtained results financial development level positively correlates with export flows while it has negative impact on import flows. Textile exports case revealed that financial development has more strong explanatory power on exports of capital intensive products than labor intensive one.

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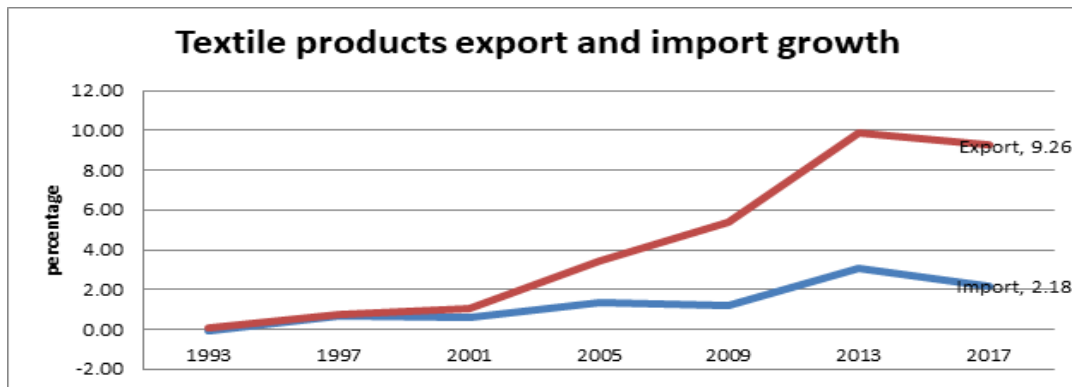
APPENDIX

Appendix A: Variables Definition, sign and Source of Data

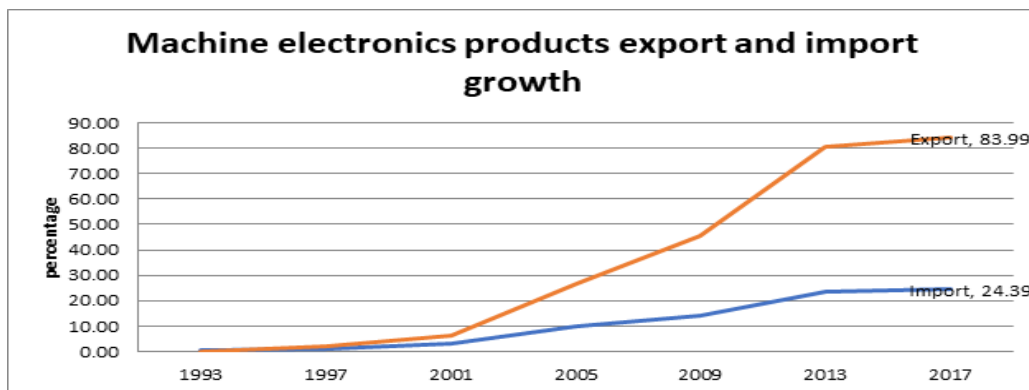
Identifier	Definition	Measurement	Expected sign	
LGDP	GDP per capita of trading partner	GDP per capita (current US\$)	(+)	World Bank, WDI http://api.worldbank.org/v2/en/indicator/NY.GDP.PCAP.CD?downloadformat=excel
LGDPCH	GDP per capita of China	GDP per capita (current US\$)	(+)	World Bank, WDI http://api.worldbank.org/v2/en/indicator/NY.GDP.PCAP.CD?downloadformat=excel
LFDP	Financial development of trading partner	Coeff.	(+/-)	World Bank, WDI http://api.worldbank.org/v2/en/indicator/FS.AST.PRVT.GD.ZS?downloadformat=excel
LFDPCH	Financial development of China	Coeff.	(+)	World Bank, WDI http://api.worldbank.org/v2/en/indicator/FS.AST.PRVT.GD.ZS?downloadformat=excel
LTOCH	Trade openness of China	Sum of export and import flows as a percentage of GDP(%)	(+)	World Bank http://api.worldbank.org/v2/en/indicator/NE.TRD.GNFS.ZS?downloadformat=excel
PCII	Income difference between trading partners	Difference between countries' GDP per capita	(-)	World Bank, WDI http://api.worldbank.org/v2/en/indicator/NY.GDP.PCAP.CD?downloadformat=excel
LREER	Exchange rate difference between China and its trading partners	Official exchange rate (LCU per US\$, period average)	(-)	International Monetary Fund, International Financial Statistics. http://data.imf.org/?sk
LLCD	Binary variable for indicating landlocked countries.	Dummy variable. Yes = 1, 0 otherwise	(-)	Mayer and Zignago (2005)
DIST	Distance between China and its trading partners	great-circle distance between capital cities of trading partners	(-)	Head and Mayer (2002) dist_cepil.xls
FTA	Binary variable indicating that whether or not both partners have Free trade agreements	Dummy variable. Yes = 1, 0 otherwise	(+)	Mayer and Zignago (2005)

Appendix B: List of countries

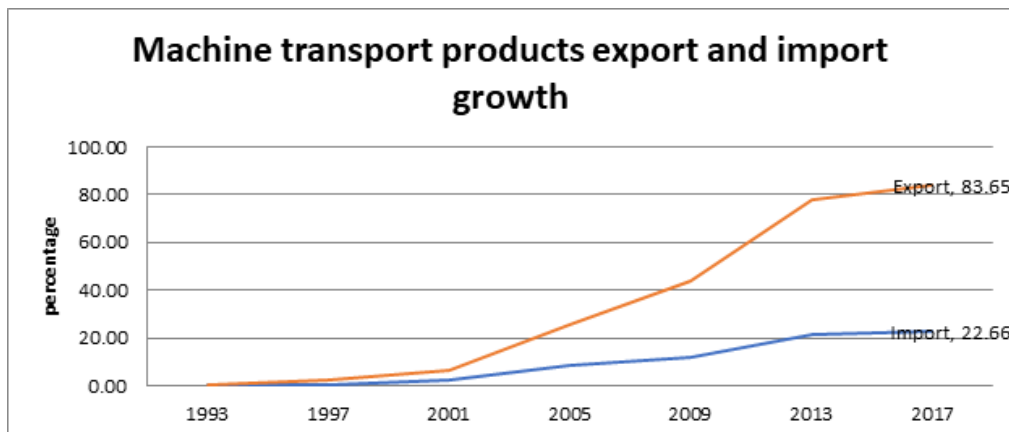
Bangladesh	Canada	USA	Greece	Mongolia
Brazil	UK	Japan	Sweden	Finland
Chile	Philippines	Korea Rep.	Paraguay	Switzerland
Iran	Italy	Thailand	Ecuador	Denmark
New Zealand	Netherlands	Vietnam	Kazakhstan	Tanzania
Saudi Arabia	Pakistan	Malaysia	Kenya	Portugal
Israel	UAE	India	Cambodia	Romania
Belgium	South Africa	Australia	Peru	Morocco
Egypt	Turkey	Indonesia	Argentina	Ghana
Sri lanka	Mexico	Germany	Myanmar	Jordan
Colombia	Spain	Singapore	Ukraine	Lebanon
Poland	France	Russia	Nigeria	Algeria



Appendix C



Appendix D



Appendix E