The Dynamic Impact of International Trade Liberalization: Entry Timing of Exporters and Financial Development*

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Abstract

This paper studies the dynamics of how trade responds to trade liberalization. Specifically, I find that exporters enter into an export market prior to the actual implementation of a trade liberalization episode (the "early entry decision") only if the financial market of an origin country is sufficiently developed. An empirical study of free trade agreements shows that the amount of early entry into export markets, measured as the extensive margin of trade during periods before tariff is actually reduced, is positively correlated with the measure of financial development of exporting countries. This new stylized fact can reconcile apparently contradictory findings in the existing literature about the effect of trade liberalization over time. I demonstrate that this discrepancy disappears when a measure of financial development, the relative size of private credit by banks and other financial intermediaries to GDP, is included in the regression and interacted with FTA time dummy variables. This empirical finding suggests that the theoretical literature modeling trade dynamics should include a financial sector.

JEL Classification: F13, F14, F15, F36, G28, G32
Keywords: forward-looking behavior, international trade, credit constraints, financial development, free trade agreements, extensive margins of trade

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1 Introduction

There has been much interest lately on the impact of financial development on trade, such as the level and type of exports (Manova (2013)). This paper uncovers a new aspect of trade where finance is important, the timing of the dynamic response of new entry to a trade liberalization. Specifically, this paper answers the question about a potential exporter's decision of when to enter into an export market – Should it enter prior to the actual implementation of a trade liberalization episode (the "early entry decision")? How does different degrees of financial market development affect the forward-looking behavior of potential exports during trade liberalization? This empirical study documents a new stylized finding that exporters enter an export market earlier than the timing when trade cost actually decreases due to trade liberalization only if the financial market of an origin country is sufficiently developed.

The finding can reconcile apparently contradictory observations in the existing literature on the effect of trade liberalization over time. Two recent papers, Bergin and Lin (2012) (hereafter, BL) and Baier, Bergstrand and Feng (2014) (hereafter, BBF) contradict each other in an observation of the early entry decision of exporters in trade liberalization periods. BL find that the extensive margin of trade in new goods responded earlier than the actual implementation of European Monetary Union, but BBF observe negative or insignificant changes in the extensive margin of trade before various levels of economic integrations enter into force up to 15 years over 149 countries. I distinguish the effect of free trade agreement (FTA) on trade by different degrees of financial development in exporting countries.

I combine the lead and lag variables of FTA time dummy with linear trends of the leads and lags, respectively, instead of using annual time dummy FTAs that may cause a multicollinearity issue with trade data combined over consecutive years. Thus, the regression estimates each slope of lead and lag linear trends over time, and one coefficient that governs the concurrent effect of FTA on trade. As in BBF, this approach resolves a possible multicollinearity problem in yearly trade data, as well as allows more degrees of freedom that implies better results with statistical significance than the method with adding many lead and lag changes, in which available sample size significantly reduces.

The empirical study of FTAs incorporates an interaction term between FTA dummy variables and the level of financial market development in an origin country, measured in the relative size of private credit provided by banks and financial intermediaries to GDP,

suggested by Beck, Demirgüç-Kunt and Levine (2000), with the traditional trade regression model introduced by Rose (2004), and developed by Baier and Bergstrand (2007) and BBF. I separate the interaction effect of financial market condition and FTA from the general effect of FTA on trade in the regression, in order to contrast to and compare with the result in BL and BBF. With a similar dataset as BBF use, I find that the interaction effect of FTA and financial market development is positively correlated with the amount of early entry. The own effect of FTA controlling financial development, however, has a negative or insignificant effect on the early entry. Thus, BBF's observation is comparable to the weighted average of the two effects because they do not control financial market development. Also BL's finding can be rationalized by the dominating second effect in their sample because they focus on European countries that have relatively more developed financial markets. The result is valid across different empirical specifications with different time horizons, from 5-year to 15-year time horizons before and after FTAs enter into force.

This paper contribute to two main lines of literature: the research on the impact of financial development on trade and the studies about the effect of trade liberalization policies on trade[1]. Recent trade literature emphasizes that the development of financial markets has an important role in international trade. Manova (2013) uses a model-driven empirical specification and shows that more developed financial market encourages export behaviors: export volume, and the intensive and extensive margins of export, especially in higher external finance dependent sectors. Recent papers study on a channel of the causal effect of financial market development on trade. Amiti and Weinstein (2011) find better trade finance caused faster growth in exports relative to domestic sales during a financial crisis in Japan. They explain that the availability of trade finance is important because exporters are more sensitive to financial shocks. Feenstra, Li and Yu (2014) find that as a firm's export share increases, the firm becomes credit constrained more strictly because the shipping time for exports is longer than domestic sales. The other research explores diverse effects of financial market development on heterogeneous firms. Several papers show better access to external finance is highly correlated with trade size at the firm level with firm-

[1]Helpman (1984) first rigorously shows how trade pattern depends on firms' investment decision with a two-country, two-sector Heckscher-Ohlin model. To the extent of my knowledge, Kletzer and Bardhan (1987) first emphasize easier access to capital as a source of comparative advantage in trade. Beck (2002), and Beck (2003) use the relative size of private credit as a measure of financial market development, suggested by Beck, Demirgüç-Kunt and Levine (2000) and find a causal impact of financial development on trade of manufactured products. For more survey over the literature, see Foley and Manova (2015).

level data from different countries[2]. My approach focuses on the dynamic effect of financial condition on trade, which is different from most research in the literature that cover the contemporaneous effect of financial development on trade. As similar to the literature, I use the extensive margin of export as a measure of export entry decision[3].

I also contribute on the literature that answers whether trade liberalization policies increase trade or not. Many studies scrutinize the effect of World Trade Organization memberships (Rose (2004); Dutt, Mihov and Zandt (2013)) and the effect of bilateral or multilateral FTAs (Kehoe and Ruhl (2013)[4], Baier and Bergstrand (2007), Baier and Bergstrand (2009)). Again, most research focuses on the contemporaneous or the long-run and permanent impact of trade liberalization on trade while only few including the present paper look at the dynamic effect of trade liberalization on trade. BBF distinguish the positive instant effect of economic integration policies including FTA and the gradual effect over time until reaching the long run, which is assumed 10 - 15 years after the policy implementation, on trade. As introduced earlier, BL perform a dynamic regression to examine the dynamic effect of EMU as a trade liberalization on trade. My other contribution is finding that the forward-looking response of exporters[5] to trade liberalization is not an observation to specific trade episodes as BL find with the EMU case but a general behavior of exporters.

This research also has implication for understanding of the theoretical literature that studies trade dynamics. In a limited number of studies on trade dynamics models, BL is the only paper that implements the early entry decision in trade liberalization dynamics independent of productivity dynamics[6]. Their theoretical model incorporates "congestion

[2]Greenaway, Guariglia and Kneller (2007) (UK), Minetti and Zhu (2011) (Italy), Bellone et al. (2010) (France), Muûls (2008) (Belgium), Berman and Héricourt (2010) (9 developing countries), and Gorodnichenko and Schnitzer (2013) (27 transition countries)

[3]Paravisini et al. (2015) do not observe the impact of credit supply on the effect of entry and exit in export markets but only intensive margin effect in Peruvian data.

[4]Kehoe and Ruhl (2013) emphasize emerging new products (the extensive margin of trade) as a gain from the North American Free Trade Agreement.

[5]Irwin (2014) in economic history literature also observes the forward-looking behavior of US sugar importers when tariff changed in the early twentieth century.

[6]Traditional dynamic trade models without productivity innovation cannot mimic the early entry decision because the free entry condition allows no option value associated with the entry and exit decisions of marginal exporters, emphasized by Atkeson and Burstein (2010). Costantini and Melitz (2008), and Burstein and Melitz (2013) show the forward-looking entry as a by-product of prior investments and productivity innovation to prepare for anticipated trade liberalization. Especially Burstein and Melitz (2013) document

externality" in sunk entry cost for exporting. Sunk cost depends on the number of active exporters so that is time-varying. In order to avoid higher sunk cost due to many entrants near the actual implementation of trade liberalization, some potential exporters enter exporting earlier than others even before trade costs actually decline as a benefit of trade liberalization. This paper delivers a clue that the "congestion externality" effect may depend on how easily firms access to credit when exporting. For the potential exporter's decision of when to enter into an export market, the benefit from the early entry (paying lower sunk entry cost) must be balanced against the cost of financing the fixed cost for production during the periods of early entry when revenues and profits are still low because the benefit from trade liberalization realizes later. This point may help BL theoretical model can explain why the less early entry is observed in the financially less developed country.

The rest of this paper is organized as follows. Section 2 introduces an empirical strategy and identifies empirical specifications. Section 3 explains data. Section 4 shows main results and sensitivity analysis results, and Section 5 suggests economic intuitions for the result as theoretical implications. Section 6 concludes. Appendix provides data description and additional empirical results.

2 Empirical Strategy

A dynamic regression is necessary to measure the size of early entry in trade. As BL use, adding leads and lags of trade liberalization implementation time dummy variables into the gravity equation is a common way to perform a dynamic regression. The regression takes the form as following.

$$\begin{aligned} Y_{ijt} =& \alpha + \sum_{s=-K}^{L} \beta_s FTA_{ijt+s} + \sum_{m=1}^{M} \gamma_m W_{m,it} + \sum_{m=1}^{M} \zeta_m X_{m,jt} + \sum_{n=1}^{N} \eta_n F_{n,ij} \\ &+ \sum_{\tau=t}^{T} \theta_\tau + \kappa_i + \lambda_j + \epsilon_{ijt} \end{aligned} \tag{1}$$

where Y_{ijt} is a measure of trade such as the extensive margin of exports (in logs) from origin

that even large sunk entry cost for exporting, which Alessandria and Choi (2007) incorporate with the trade model to explain the dynamic behavior of exports, does not provide any incentive to enter export markets early.

i to destination j in year t, FTA_{ijt+s} is a set of time dummies for the leads (up to K years ahead of the year when FTA between the two countries enters into force) and lags (up to L years after the implementation of FTA) of a bilateral free trade agreement between i and j in year t, W_{it} and X_{jt} are sets of time varying country specific variables such as the logs of real GDP per capita of exporter i and importer j in year t, and M is the number of variables included as W_{it} and X_{jt}. F_{ij} is a set of variables that do not vary over time and describe bilateral relations between i and j such as the logs of distance between the two countries where N is the number of F_{ij} variables. Time and country-specific fixed effect terms, θ_t, κ_i, and λ_j are also included in the regression to capture any possible omitted variables that could affect bilateral trade variables between the two countries as following Rose (2004).

As Baier and Bergstrand (2007) and BBF point out, however, the time-fixed effect type lead and lag changes in the FTA time dummy variables cannot fully capture the effect of FTA over time because trade flows have serially dependence over consecutive years[7]. An alternative approach suggested by BBF is using linear trends of the leads and lags of FTA variables as well as a concurrent time dummy variable for FTA. This method has two advantages. First, using linear trends over sufficient time horizon helps avoid a possible multicollinearity problem. Second, this approach allows better results with statistical significance than the method with adding many lead and lag changes does because the latter reduces available sample size significantly more. The following is an empirical specification used by BBF to examines the time path of adjustment of trade measure to FTA with fixed effects.

$$\begin{aligned}\log Y_{ijt} =& \alpha + \beta_0 FTA_{ijt} + \beta_{lead} \sum_{f=1}^{K} (t-f) FTA_{ijt-f} + \beta_{lag} \sum_{l=1}^{L} (t+l) FTA_{ijt+l} \\ &+ \eta_{it} + \upsilon_{jt} + \nu_{ij} + \epsilon_{ijt} \end{aligned} \tag{2}$$

[7]Baier and Bergstrand (2007) suggest using 5-year differencing of trade data to observe the overall effect of FTA on trade following Wooldridge (2012) that advocates "using longer differences over time" (p.463). Cheng and Wall (2005) also discuss this issue in fixed-effect estimations with trade data "pooled over consecutive years $\cdots$ (for) variables cannot fully adjust in a single year's time" (p.52). Differencing over longer time horizon, however, only works for empirical observations of relatively long-term effect of FTA because this method makes yearly data between the interval unavailable. Thus, longer year differencing is not valid for our case that focuses on transition periods before FTA.

where η_{it} is an exporter-time fixed effect, υ_{jt} is an importer-time fixed effect, and ν_{ij} is a country-pair fixed effect. Exporter-time and importer-time fixed effects capture time-varying country-specific terms that affect trade, for example, GDP of exporter and importer as well as unobservable country-time specific terms, for example, multilateral price resistance terms that Anderson and van Wincoop (2003) emphasize their crucial role in the gravity regression. Time-invariant bilateral variables such as distance between country i and j are also captured by the country-pair fixed effect terms. This regression model is referred as the fixed-effects (FE) specification in BBF so I will call this (BBF-FE) specification.

In (BBF-FE) specification, notice that all lead terms are used in estimating only one coefficient β_{lead} that describes the slope of linear "lead" trend of trade variables correlated with FTA. If β_{lead} is positive, trade variables that have a statistical association with FTA variables increase during periods ahead of the actual implementation of FTA. Negative β_{lead} suggests that the variables during the periods before tariff actually reduces are negatively correlated with FTA. Similarly, β_{lag} captures the slope of linear "lag" trend in trade variables related to FTA.The concurrent effect of FTA on trade variables governs β_0. If β_{lead} is positive, it can be an evidence of the early entry for exporting. Otherwise, the early entry would be weak. BBF find slightly negative or insignificant β_{lead}.

This paper introduces a new specification to separate the effect of an interaction of FTA and financial development from the general effect of FTA on trade. This decomposition method is important specially to examine the early entry decision of potential exporters because financial market development affects exporters' decision (Beck (2002), Manova (2013)). Financially constrained firms are less likely to enter export markets because it is harder for them to pay sunk export entry cost, formularized in Melitz (2003), before they receive revenues and enjoy profits from export markets. To observe different effects of FTA on trade by different levels of financial market development, the new specification includes an interaction term between FTA time dummy variables that (BBF-FE) already take into account and the financial market development measure of exporting countries (in logs) in addition to the (BBF-FE) model. A coefficient for the interaction term captures the effect of FTA only related to financial development, while the coefficient for the overall FTA dummy variables without interactions reveals the other effect of FTA controlling financial market condition.

The new fixed-effect model is described by the following equation.

$$\begin{aligned}\log Y_{ijt} =& \alpha + \beta_0 FTA_{ijt} + \beta_{lead} \sum_{f=1}^{K} (t-f) FTA_{ijt-f} + \beta_{lag} \sum_{l=1}^{L} (t+l) FTA_{ijt+l} \\ &+ \beta_1 FTA_{ijt} \times Fin_{it} + \beta_{(lead-fin)} \sum_{f=1}^{K} (t-f) FTA_{ijt-f} \times Fin_{it-f} \\ &+ \beta_{(lag-fin)} \sum_{l=1}^{L} (t+l) FTA_{ijt+l} \times Fin_{it+l} + \eta_{it} + \upsilon_{jt} + \nu_{ij} + \epsilon_{ijt} \end{aligned} \tag{3}$$

where Fin_{it} is the measure of financial market development in an origin country i (in logs). Its detail will be addressed in the following Data section. Now $\beta_{lead-fin}$ captures the effect of an interaction of FTA and financial development on trade variables before the implementation of FTA, and other effect of FTA independent from financial development is revealed by β_{lead}. Similarly, β_1 measures the size of concurrent effect of FTA on trade variables by different levels of financial market development while β_0 is the coefficient for the concurrent effect of FTA on trade. $\beta_{lag-fin}$ and β_{lag} show the size of impact of FTA on trade related and unrelated to financial development, respectively. Notice that the unobservable effect of Fin_{it} itself is captured by η_{it} if it is added. Thus, it is abstracted in the model because the overall effect of financial market development on trade variables is not the interest of this paper. I refer this new model to (FE).

In the regression, time windows for lead trends (K) and for lag trends (L) should be chosen. To observe dynamics of trade in transition periods of FTA, the time window covers from the earliest time period when FTA can be anticipated to the latest point when FTA effect is fully reflected on trade variables in the long-run. Most literature considers 10 to 15 years as a long-run after trade liberalization and BBF also use 15-year window to observe the long-term effect of FTA on trade. It is harder to choose appropriate K for lead trends. I propose using 10-year intervals for K to observe "forward-looking behavior" of exporters fully enough, because waiting times between initiating FTA talks and the actual implementation of FTA are normally 3-10 years[8]. For instance, the impetus for NAFTA developed in the 1980s. In 1984, Congress passed the Trade and Tariff Act before Canada requested a trilateral agreement in 1991. As publicly known NAFTA went into force in 1994. Recent FTAs have taken relatively shorter negotiation processes but there is a substantial time gap

[8]BBF use a symmetric time window of 15-year length before and after FTAs.

between the impetus and the commencement of FTAs. Based on these points, the main model takes $K = 10$ and $L = 15$. I will also show results are robust with different time windows later.

3 Data

Three main variables are used for this research: disaggregated bilateral trade flows, index of FTA by country-pair and years that the agreements enter into force, and the financial market development measure of countries.

First, annual bilateral import and export data from NBER-UN World Trade Data (obtained from `www.nber.org/data`, see Feenstra et al. (2005)) are used for the empirical analysis. The data originally cover trade flows categorized by SITC-4 over 149 countries during 1962-2000, but 133 countries that also have financial market development measures are included in the sample. Three different trade variables are considered in the empirical study: the real value of exports, the extensive and intensive margins of exports computed with the Hummels and Klenow (2005) margin-decomposition methodology adopting the methodology in Feenstra (1994) and Feenstra and Kee (2004).

The extensive margin of exports from origin i to destination j in year t, denoted by EM_{ijt} is defined as

$$EM_{ijt} = \frac{\sum_{m \in M_{ijt}} X^m_{Wjt}}{X_{Wjt}} \tag{4}$$

where M_{ijt} is the set of all product categories exported from country i to country j in year t, X^m_{Wjt} is the value of exports from the world to country j of product category m in year t, and X_{Wjt} is the aggregate value of exports from the world to country j in year t.

The intensive margin of exports from origin i to destination j in year t, denoted by IM_{ijt} is defined as

$$IM_{ijt} = \frac{X_{ijt}}{\sum_{m \in M_{ijt}} X^m_{Wjt}} \tag{5}$$

where X_{ijt} is the total value of exports from origin i to destination j in year t.

By construction, the share of exports from i to j in the world exports to country j is given by

$$\frac{X_{ijt}}{X_{Wjt}} = EM_{ijt} \times IM_{ijt} \tag{6}$$

Second, FTA data including country-pairs that agree FTAs and years that each FTA enters into force (obtained from `http://www3.nd.edu/~jbergstr/`, which has been constructed and updated by Baier and Bergstrand (2015)) are used. Their original data cover six different levels of international economic integrations, but only the free trade agreement variable is considered in the present paper. From bilateral and multilateral free trade agreements with annual frequency among 195 countries during 1960-2005, the agreements data among 133 countries during 1962-2000 are used for data coherence.

Last variable for the empirical study is the financial market development measure in an exporting country. As Beck (2002) proposed, I use the ratio (%) of the amount of private credit provided by deposit banks and other financial intermediaries to GDP of the country in each year as a measure of financial development. Although this measure is an outcome of financial market, determined by credit supply and demand, it still indicates how easily firms can access to credit market in each country in a specific year. Since any measure specific to exporters is not available, this measure has been widely used as a proxy for financial accessibility of exporters that need finance upfront exporting costs in trade literature such as Beck (2002), and Manova (2013)[9] The original data obtained from World Bank (Beck, Demirgüç-Kunt and Levine (2013), `http://go.worldbank.org/X23UD9QUX0`) cover 133 countries during 1960-2010, but as mentioned earlier, merging the three data reduces the sample to cover 133 countries during 1962-2000.

[9]Other data for financial market condition is legal system stability for financial markets such as the repudiation of contracts, accounting standards, and the risk of expropriation (La Porta et al. (1998)). They only cover cross-sectional changes across only up to 49 countries in the single year 1993. Most FTAs have been realized after 1993 and time-variant condition for each country is important to distinguish the effect of financial market over transition periods to trade liberalization. Thus, their data are not considered in this paper.

4 Results

This section first introduces the results using (BBF-FE) as a benchmark model described by Equation (2). Then I compare the results of (FE) model shown in Equation (3) with financial market development measure to the benchmark. It shows how controlling financial market development measure possibly affects the result of BBF so that it explains how the discrepancy in observations about early entry decision in the literature can be reconciled. Several robustness check results follow.

4.1 Main Results

Table 1 reports the benchmark result using the (BBF-FE) specification with three different trade variables: the real value of exports, the extensive margin of exports (EM), and the intensive margin of exports. As explained in the previous section, 10-year window for leads and 15-year window for lags are used to fully capture the forward-looking behavior and long-run effect of trade. The results fulfill the observations in BBF. The effect of FTA takes long time to reveal its full effect on trade. The coefficient estimates on the linear trends for the 15 years of lagged log value of exports, the extensive and intensive margins of exports in logs are strongly positive and statistically significant. The lagged trend for FTA time dummies increase the real value of exports about 5% annually, or 102% over 15 years, which is close to the conclusion of Baier and Bergstrand (2009) that FTAs double participants' bilateral trade in the long-run. The coefficient estimates on the linear trends for lead variables are similar to the result in BBF that obtained slightly negative or insignificant coefficient estimates on the lead trends.

Since the interest of this paper is the early entry of potential exporters, consider the estimate on $FTA_{lead\ trend}$ for the extensive margin of exports, the measure of early entry of exporters. The hypothesis that It is not different from zero is rejected with up to 77% confidence level. It confirms that, as BBF find, no early entry is observed on average over the sample countries over the world. The extensive margin of exports slightly decreases in the year of FTA but increases after that 3.9% annually. The accumulated effect of FTA on the extensive margin is about 70% while BBF observe about 53% increase in the extensive margin of exports until 15 years after FTAs enter into force. Due to the availability of financial development data, which is crucial for the present paper, the data coverage is

Table 1: BBF-FE with linear trends up to 10 years of lead and 15 years of lag

dependent variable	log export	log EM	log IM
FTA_{ijt}	-0.108^{***}	-0.075^{***}	-0.033^{*}
	(-5.33)	(-4.52)	(-1.86)
$FTA_{lag\ trend}$	0.048^{***}	0.039^{***}	0.009^{***}
	(24.88)	(26.05)	(5.61)
$FTA_{lead\ trend}$	-0.004	-0.003	-0.001
	(-1.19)	(-1.20)	(-0.29)
constant	-6.633^{**}	-2.997	-3.636^{**}
	(-2.49)	(-1.58)	(-2.34)
$FE_{i,t}$	Yes	Yes	Yes
$FE_{j,t}$	Yes	Yes	Yes
$FE_{i,j}$	Yes	Yes	Yes
N	246840	246840	246840
R^2	0.86	0.80	0.71

t statistics computed with robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

relatively small (133 countries) compared to BBF's (149 countries), and they also consider other economic integrations than FTA. The length of lead trend in the current analysis is 10-year while BBF use 15-year window. The main point, however, on the early entry for exporting is still confirmed. Any early dynamics in export value or its intensive margin are not observed. The estimation coefficients on the linear lag trend and the contemporaneous time dummy of FTA are also statistically insignificant.

Here consider the new specification (FE) model with the financial market development measure. Table 2 reports the results for (FE) with three different trade variables: the real value of export, the extensive margin of export (EM), and the intensive margin of export (IM). The same lengths of lead (up to 10 years) and lag (up to 15 years) terms are used as in (BBF-FE). The (FE) model decomposes the effects of FTAs in transition periods and highlights the key findings. The main finding contrasts to (BBF-FE) observation of no early entry of exporters. Especially for the value of exports and the extensive margin of exports in logs, the coefficient estimates on the linear trend for the 10 years of lead values of FTA time dummies interacted with exporting country's financial market development measure in logs ($FTA_{lead\ trend} \times fin_{it}$) are statistically significant and positive at very high level of confidence. The coefficient for export values says 1.2% of exports increases annually per 1% change in the relative size of private credit to GDP, the measure of financial development, up to 10 years in ahead of the actual implementation of FTAs. Exporters enter early, measured as 0.8% of the extensive margin of exports that increases annually for 1% change in the financial market development measure. The coefficients look small but they are actually very striking results when looking at cross-sectional difference. For example, the extensive margin of exports of the US, one of the most financially developed countries, that has private credit market relative to GDP about 2.2 times as large as the average country's, in terms of the financial development measure, is about twice as large as the extensive margin of exports that the average country would have if controlling any other country and time specific effects. In a similar way, the size of export values of the U.S. is about 144% as large as the export values of the average country.

What (BBF-FE) specification observe is a combination of the interaction effect between FTA and financial market development and the effect of FTA unrelated to financial market. Thus, the weighted average of these two effects can represent the observable early entry in each country. Notice that the coefficient on the lead trends of only FTA ($FTA_{lead\ trend}$) is slightly negative and the interaction effect is positive and proportional to the level of

Table 2: FE with linear trends up to 10 years of lead and 15 years of lag

dependent variable	log export	log EM	log IM
FTA_{ijt}	-0.248^{**}	-0.371^{***}	0.123
	(-2.16)	(-3.87)	(1.14)
$FTA_{lag\ trend}$	0.043^{***}	0.003	0.041^{***}
	(2.64)	(0.23)	(3.14)
$FTA_{lead\ trend}$	-0.043^{***}	-0.031^{***}	-0.012
	(-4.22)	(-3.95)	(-1.42)
$FTA_{ijt} \times fin_{it}$	0.033	0.075^{***}	-0.042
	(1.15)	(3.12)	(-1.56)
$FTA_{lag\ trend} \times fin_{it}$	0.001	0.008^{***}	-0.007^{**}
	(0.23)	(3.12)	(-2.44)
$FTA_{lead\ trend} \times fin_{it}$	0.012^{***}	0.008^{***}	0.003
	(4.23)	(3.92)	(1.48)
constant	-6.631^{**}	-2.996	-3.636^{**}
	(-2.49)	(-1.58)	(-2.34)
$FE_{i,t}$	Yes	Yes	Yes
$FE_{j,t}$	Yes	Yes	Yes
$FE_{i,j}$	Yes	Yes	Yes
N	246840	246840	246840
R^2	0.86	0.80	0.71

t statistics computed with robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

financial market development in an origin country. Thus, in countries that have poor financial markets, the early entry of potential exporters would be hardly observed, while it would be seen commonly in financially developed countries. BL that find the early entry behavior in the EMU episode examine European countries that have relatively more developed financial markets, while BBF model estimates the overall average size of early entry of potential exporters, which is actually very diverse across countries by different levels of financial development. In other words, (BBF-FE) model looks at the size of early entry as if every country in the world had similar financial market development. If the sample consists of only the average country in terms of financial market development, the interaction effect between FTA and financial development on trade in "lead" periods offsets most of the own effect of FTA when financial development is controlled. This point can explain why BBF observe no early entry while BL do.

Other coefficients also economically make sense. The coefficients on the intensive margin of exports are insignificant for both the interaction effect and the own effect of FTA. Exporters that already enter the export country, a partner of FTA may not have much incentive to increase export because tariff is still high. The intensive margin of export, however, increases after FTA enters into force.

4.2 Robustness Check

The result might be sensitive to the length of time windows for the lead and lag trends. For robustness results, I also provide the results with different time windows. Table 3 and 4 show the results with symmetric time windows of 15-year for the lead and lag trends, as BBF use. As BBF find, the coefficients on 15-year linear lead annual trend that yields the evidence of early entry on average slightly negative shown in Table 3. The coefficients on the lead trend for the interaction between FTA time dummy variables and financial market development measures are still positive. Thus, the conclusion that the forward-looking behavior of potential exporters is sensitive to the level of financial development is still valid. Other results with 5-year and 10-year time windows for the lead and lag trends go to Appendix. They also confirm the conclusion.

Table 3: BBF-FE with linear trends up to 15 years of lead and 15 years of lag

dependent variable	log export	log EM	log IM
FTA_{ijt}	-0.053^{***}	-0.052^{***}	-0.001
	(-2.78)	(-3.30)	(-0.09)
$FTA_{lag\ trend}$	0.050^{***}	0.039^{***}	0.010^{***}
	(26.37)	(27.19)	(6.42)
$FTA_{lead\ trend}$	-0.013^{***}	-0.006^{***}	-0.006^{***}
	(-6.13)	(-3.97)	(-3.60)
constant	-6.639^{**}	-3.000	-3.640^{**}
	(-2.50)	(-1.59)	(-2.34)
$FE_{i,t}$	Yes	Yes	Yes
$FE_{j,t}$	Yes	Yes	Yes
$FE_{i,j}$	Yes	Yes	Yes
N	246840	246840	246840
R^2	0.86	0.80	0.71

t statistics computed with robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: FE with linear trends up to 15 years of lead and 15 years of lag

dependent variable	log export	log EM	log IM
FTA_{ijt}	-0.258^{**}	-0.383^{***}	0.125
	(-2.26)	(-4.01)	(1.16)
$FTA_{lag\ trend}$	0.046^{***}	0.003	0.042^{***}
	(2.77)	(0.28)	(3.27)
$FTA_{lead\ trend}$	-0.032^{***}	-0.021^{***}	-0.010
	(-4.25)	(-3.73)	(-1.64)
$FTA_{ijt} \times fin_{it}$	0.050^{*}	0.084^{***}	-0.034
	(1.77)	(3.53)	(-1.26)
$FTA_{lag\ trend} \times fin_{it}$	0.001	0.008^{***}	-0.008^{**}
	(0.20)	(3.14)	(-2.48)
$FTA_{lead\ trend} \times fin_{it}$	0.006^{***}	0.005^{***}	0.001
	(2.75)	(2.80)	(0.71)
constant	-6.638^{**}	-3.000	-3.640^{**}
	(-2.50)	(-1.59)	(-2.34)
$FE_{i,t}$	Yes	Yes	Yes
$FE_{j,t}$	Yes	Yes	Yes
$FE_{i,j}$	Yes	Yes	Yes
N	246840	246840	246840
R^2	0.86	0.80	0.71

t statistics computed with robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5 Theoretical Implications

The empirical finding of different dynamic behaviors in the early entry decision of exporters, measured as the extensive margin of exports, by different levels of exporting country's financial development provides an important implication for theoretical models that study trade dynamics due to trade liberalization. Typical dynamic trade models, in which productivity innovation and other frictions such as a congestion externality used in BL are abstracted, cannot mimic the early entry decision even nor gradual changes in the amount of entry of exporters because the free entry condition with the perfect financial market allows no option value associated with the entry and exit decisions of marginal exporters (Atkeson and Burstein (2010)). Thus, two approaches that preserve the early entry of potential exporters in the theoretical literature incorporate additional dynamic processes.

The firm-dynamics models that account for productivity dynamics and investment decisions during trade liberalization (Costantini and Melitz (2008), and Burstein and Melitz (2013)) can generate the early entry decision of exporters, but the early entry is a "by-product" of prior investments for productivity innovation to prepare for anticipated trade liberalization. For the anticipated positive shock, trade liberalization, potential exporters accumulate capital with investments to increase the probability of getting better technology of production. The innovation increases revenues and profits from the domestic market for potential exporters. Also the potential exporters earn higher productivity than the cutoff level of productivity for exporting so that they enter export markets even when trade costs are still higher than the anticipated level after trade liberalization.

BL is the only exception that implements the early entry decision in trade liberalization dynamics independent of productivity dynamics. Their theoretical model incorporates the "congestion externality" in sunk entry cost for exporting[10]. Sunk entry cost depends on the number of active exporters so that it is time-varying[11]. In order to avoid higher sunk cost

[10]The congestion externality is a common result in monetary search-and-matching models *à la* Rocheteau and Wright (2005). See Berentsen and Waller (2009) for examples. BL use the concept motivated by search and advertising costs. The other possible background for the sunk cost is increasing competition as a strategic behavior during the transition period of trade liberalization. Frésard and Valta (2015) find that incumbent domestic producers reduce investment in response to higher entry threat due to reductions of import tariffs.

[11]Only a time-variant change in the sunk entry cost works for models to show the early entry to export markets, and the absolute size of sunk entry cost is irrelevant to the early entry. Burstein and Melitz (2013) document that even large sunk entry cost for exporting, which Alessandria and Choi (2007) incorporate

that realizes due to many entrants near the actual implementation of trade liberalization, some potential exporters enter exporting earlier than others even before trade costs actually decline as a benefit of trade liberalization. This paper delivers a clue that the "congestion externality" effect may depend on how easily firms access to credit[12] when exporting. Financial constrained firms may not be able to enter early even if they want to avoid higher sunk entry cost.

In order to decide when to enter into an export market, potential exporters must compare the benefit from the early entry (paying lower sunk entry cost) to the cost of financing[13] the fixed cost for production[14] during the periods of early entry when revenues and profits are still low because the benefit from trade liberalization realizes later. This implication may allow BL theoretical model to account for the finding that less developed financial market impedes potential exporters' early entry into export markets.

6 Conclusions

This empirical paper studies the dynamics of how trade responds to trade liberalization and financial development interactively. Especially, I focus on whether potential exporters enter into an export market prior to the actual implementation of FTAs or not. I find that the early entry decision, measured as the extensive margin of exports during periods before tariff is actually reduced, is observed only if the financial market of an origin country is sufficiently developed. This new stylized fact can reconcile apparently contradictory findings in the recent papers, BL and BBF that have different findings on the early entry response to trade liberalization.

Without controlling financial market development of an origin country, measured in the size of private credit provided by banks and financial intermediaries relative to GDP

with the trade model to explain the dynamic behavior of exports, does not provide any incentive to enter export markets early.

[12]Few recent studies consider financial constraints into the dynamic trade model with investment for productivity. See Brooks and Dovis (2013) and Caggese and Cuñat (2013).

[13]The cost of financing the sunk entry cost is completely offset by the increased value of firms due to expected (without uncertainty) additional future profit stream from export markets because of the free entry condition, pointed by Atkeson and Burstein (2010).

[14]The fixed cost for production in each period is usually considered in the dynamic trade models in order to have stationary measure of active firms over the infinite time horizon.

of an origin country in each year, only the mixture of two effects, a combination of the interaction effect between FTA and financial market development, and the own effect of FTA unrelated to financial market is observed. The effect FTA interacted with financial development, however, is absolutely different across countries by different levels of financial development. Thus, from countries that have poor financial markets, the early entry of potential exporters would be hardly observed, while it would be seen commonly from financially developed countries.

BL that find the early entry behavior in the EMU episode from samples of European countries that have relatively more developed financial markets. BBF estimates the average size of early entry of potential exporters across countries, which does not reflect the diversity in financial market development across countries. I reproduce the BBF observation on no early entry decision of potential exporters with the estimated result for the hypothetical country that has the average level of financial development. For this country, the interaction effect between FTA and financial development on trade prior to the actual implementation of FTA offsets most of the own effect of FTA when financial development is controlled. The result also points out the size of early entry increases in more developed financial markets. It explains why BBF observe no early entry while BL do.

This empirical finding provides an important implication for the theoretical literature modeling trade dynamics that a financial sector should be considered in the models in order to see the diverse behavior in trade dynamics. Normally, dynamic trade models cannot generate the early entry without productivity innovation process nor other frictions such as a congestion externality. Firm dynamics model that accounts for productivity innovation can implement the early entry as a by-product of prior investment before tariff reductions. BL that incorporate the "congestion externality" in sunk entry cost for exporting into the model is the only exception that implements the early entry decision in trade liberalization dynamics independent of productivity dynamics. This paper delivers a clue that the "congestion externality" effect may depend on how easily firms access to credit when exporting. Financial constrained firms may not be able to enter early even if they want to avoid higher sunk entry cost.

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Table 5: Source of Data

Variable	Source	Data Span
Exports	NBER-UN World Trade Data (`www.nber.org/data`)	149 countries, 1962-2000
FTA	Baier and Bergstrand (2015) (`http://www3.nd.edu/~jbergstr/`)	513 country-pairs among 133 countries during 1962-2000 have FTAs
Financial Market Measure	Beck (2002) (`http://go.worldbank.org/X23UD9QUX0`)	133 countries during 1960-2010

Table 6: Summary of Financial Development Measure (%) of Countries

Country	# of Obs.	Mean	Std. Dev.	Min.	Max.
Albania	127	3.53	0.28	3.08	3.89
Algeria	1,288	36.39	24.12	4.15	67.67
Angola	113	2.24	1.19	1.14	3.93
Argentina	4,025	14.60	4.51	8.50	25.17
Australia	4,346	37.90	20.34	17.61	83.48
Austria	4,510	64.63	20.78	33.31	98.30
Bahamas, The	1,134	46.99	8.28	34.02	62.43
Bahrain	1,099	43.99	10.82	28.05	62.28
Bangladesh	343	20.25	2.56	15.12	22.70
Barbados	975	39.06	6.95	28.66	55.51
Belgium	4,739	31.43	20.86	9.76	77.36
Belize	265	40.02	5.12	30.49	47.51
Benin	251	9.19	2.30	6.24	14.06
Bhutan	334	6.09	2.51	2.53	10.32
Bolivia	1,320	19.54	17.60	1.51	63.04
Brazil	2,544	29.69	8.45	10.25	41.77
Bulgaria	623	29.70	20.03	8.71	68.29
Burkina Faso	988	9.06	4.49	2.16	16.23
Burundi	686	10.10	5.21	2.47	21.11
Cambodia	202	4.90	0.96	3.08	5.88
Cameroon	1,480	17.76	7.01	6.66	28.46
Canada	4,698	62.90	27.40	17.59	99.31
Central African Republic	382	6.60	2.79	3.81	12.71
Chad	293	6.72	4.98	3.24	21.46
Chile	2,745	34.70	23.17	2.74	67.01
China	1,800	83.83	11.89	68.47	107.18
Colombia	3,070	24.18	6.42	10.16	35.65
Comoros	13	11.39	0.00	11.39	11.39
Costa Rica	1,945	20.39	6.27	10.47	28.31
Cyprus	2,070	86.04	48.15	38.24	202.19
Denmark	4,927	31.84	11.34	21.66	83.62
Djibouti	25	43.82	11.51	30.12	54.47
Dominican Republic	1,536	26.91	11.95	5.56	49.46
Ecuador	2,214	20.14	6.83	12.93	40.67
Egypt, Arab Rep.	2,676	23.63	9.88	14.83	56.02
El Salvador	1,525	24.78	6.84	16.82	43.53
Equatorial Guinea	182	9.95	8.50	2.73	25.91
Ethiopia	1,528	12.87	3.75	7.05	23.59
Fiji	812	23.27	8.85	10.70	39.65
Finland	4,447	51.29	16.34	36.03	92.17
France	4,790	76.49	16.15	44.81	99.88
Gabon	1,423	14.67	4.75	6.61	31.56
Gambia, The	660	14.57	4.24	8.57	23.92

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Country	# of Obs.	Average	Std. Dev.	Min.	Max.
Germany	1,072	101.99	9.16	86.29	116.54
Ghana	1,820	5.98	2.80	1.39	11.66
Greece	4,022	25.57	9.25	11.19	42.58
Guinea-Bissau	215	7.18	2.12	4.41	12.96
Guyana	170	43.55	11.82	23.17	55.80
Haiti	983	8.00	4.15	1.47	13.74
Honduras	1,631	25.71	6.48	9.94	37.94
Hong Kong, China	1,047	145.65	15.67	124.82	176.45
Hungary	1,324	27.38	8.81	16.19	47.37
Iceland	619	47.48	13.71	30.52	82.34
India	4,317	18.64	6.51	8.29	28.96
Indonesia	1,934	33.51	15.35	9.00	53.53
Iran, Islamic Rep.	2,585	24.27	5.19	15.75	41.81
Iraq	994	10.18	2.42	6.57	13.36
Ireland	4,528	53.14	15.29	30.42	95.96
Israel	3,473	41.61	16.33	12.94	72.40
Italy	4,675	56.59	7.33	46.47	71.23
Ivory Coast	2,491	27.61	8.98	14.91	41.19
Jamaica	1,731	22.37	4.52	13.57	30.66
Japan	5,103	142.54	49.60	61.74	231.41
Jordan	1,026	59.75	13.44	32.82	75.80
Kenya	2,224	22.29	6.51	11.63	33.01
Korea, Rep.	3,492	50.28	12.58	33.04	79.03
Kuwait	1,352	44.70	26.77	7.91	99.96
Lao PDR	233	6.82	2.48	0.45	9.19
Libya	658	8.74	4.17	3.60	16.69
Madagascar	1,836	14.11	2.25	7.95	17.97
Malawi	642	10.36	4.81	3.98	19.11
Malaysia	3,987	62.26	44.61	8.36	155.17
Mali	375	13.13	2.42	8.85	17.16
Malta	2,063	45.42	24.78	12.47	101.82
Mauritius	1,180	29.33	11.01	15.21	54.92
Mexico	3,298	21.91	6.84	8.68	33.24
Mongolia	144	7.08	1.37	5.67	10.78
Morocco	3,525	24.36	11.43	11.00	48.89
Mozambique	233	11.16	2.11	8.31	15.39
Myanmar	1,372	5.48	1.48	2.56	8.92
Nepal	993	9.72	7.57	1.25	27.73
Netherlands	4,761	56.15	25.32	21.56	125.47
New Zealand	3,917	37.81	34.59	9.80	107.02
Nicaragua	33	30.65	0.00	30.65	30.65
Niger	723	9.43	4.51	3.54	18.25
Nigeria	2,366	8.19	3.58	3.29	17.94
Norway	4,616	58.74	11.66	47.34	79.21
Pakistan	4,269	22.07	2.81	13.27	27.52

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Country	# of Obs.	Average	Std. Dev.	Min.	Max.
Panama	2,051	46.44	19.07	11.30	93.16
Papua New Guinea	881	18.25	4.72	11.42	29.22
Paraguay	1,690	16.46	5.82	4.69	29.03
Peru	2,863	14.09	5.22	4.89	27.80
Philippines	3,396	31.45	9.50	17.01	55.60
Poland	1,775	30.09	18.93	14.25	90.54
Portugal	4,193	55.60	13.52	37.48	113.36
Rwanda	551	5.33	2.34	1.37	9.50
Samoa	187	17.25	6.01	9.45	28.65
Saudi Arabia	1,969	37.14	23.50	2.20	74.21
Senegal	1,364	21.86	7.72	12.37	34.28
Seychelles	564	16.32	4.10	8.51	22.46
Sierra Leone	1,011	4.93	1.66	1.91	7.78
Singapore	3,756	75.95	24.43	34.64	117.48
South Africa	2,891	75.77	28.85	17.84	127.02
Spain	3,371	71.68	5.54	62.30	90.12
Sri Lanka	3,008	14.57	5.54	7.11	28.72
St. Kitts and Nevis	618	56.14	12.24	37.57	72.38
Sudan	2,036	8.61	3.34	1.28	12.42
Suriname	797	22.35	9.72	4.86	41.63
Sweden	4,886	78.12	20.12	36.43	122.41
Switzerland	3,752	129.34	28.51	91.65	162.97
Syrian Arab Republic	1,500	8.73	4.60	3.71	19.46
Tanzania	523	6.78	3.65	1.39	12.59
Thailand	3,954	64.97	45.27	12.48	165.80
Togo	964	20.22	5.31	10.73	30.22
Trinidad and Tobago	2,131	26.00	11.19	8.16	47.95
Tunisia	944	57.51	5.00	48.67	65.72
Turkey	2,922	16.45	2.30	13.11	20.53
Uganda	558	3.37	1.43	1.10	6.00
United Kingdom	5,110	56.51	39.19	17.40	119.43
United States	4,946	104.54	22.17	76.01	168.77
Uruguay	2,027	23.27	13.17	5.36	54.60
Venezuela, RB	2,775	27.40	13.14	8.40	56.32
Vietnam	264	21.62	4.89	17.24	30.41
Yemen, Rep.	33	4.65	0.00	4.65	4.65
Zambia	496	6.38	1.31	3.69	8.57
Zimbabwe	878	0.30	0.61	0.01	4.70
Overall	246,840	43.17	35.94	0.01	231.41

Table 7: BBF-FE with linear trends up to 5 years of lead and 5 years of lag

dependent variable	log export	log EM	log IM
FTA_{ijt}	-0.295^{***}	-0.185^{***}	-0.111^{***}
	(-12.91)	(-9.84)	(-5.55)
$FTA_{lag\ trend}$	0.116^{***}	0.078^{***}	0.038^{***}
	(20.74)	(17.38)	(7.71)
$FTA_{lead\ trend}$	0.018^{***}	0.012^{**}	0.006
	(2.76)	(2.39)	(1.01)
constant	-6.624^{**}	-2.990	-3.634^{**}
	(-2.48)	(-1.58)	(-2.34)
$FE_{i,t}$	Yes	Yes	Yes
$FE_{j,t}$	Yes	Yes	Yes
$FE_{i,j}$	Yes	Yes	Yes
N	246840	246840	246840
R^2	0.86	0.80	0.71

t statistics computed with robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8: FE with linear trends up to 5 years of lead and 5 years of lag

dependent variable	log export	log EM	log IM
FTA_{ijt}	-0.680^{***}	-0.596^{***}	-0.084
	(-5.34)	(-5.58)	(-0.69)
$FTA_{lag\ trend}$	0.201^{***}	0.048^{**}	0.153^{***}
	(6.59)	(1.96)	(5.75)
$FTA_{lead\ trend}$	-0.058^{***}	-0.045^{***}	-0.012
	(-3.04)	(-3.08)	(-0.79)
$FTA_{ijt} \times fin_{it}$	0.096^{***}	0.105^{***}	-0.008
	(3.05)	(3.95)	(-0.27)
$FTA_{lag\ trend} \times fin_{it}$	-0.022^{***}	0.006	-0.029^{***}
	(-2.98)	(1.04)	(-4.37)
$FTA_{lead\ trend} \times fin_{it}$	0.023^{***}	0.017^{***}	0.006
	(4.50)	(4.36)	(1.38)
constant	-6.623^{**}	-2.989	-3.634^{**}
	(-2.48)	(-1.57)	(-2.34)
$FE_{i,t}$	Yes	Yes	Yes
$FE_{j,t}$	Yes	Yes	Yes
$FE_{i,j}$	Yes	Yes	Yes
N	246840	246840	246840
R^2	0.86	0.80	0.71

t statistics computed with robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: BBF-FE with linear trends up to 10 years of lead and 10 years of lag

dependent variable	log export	log EM	log IM
FTA_{ijt}	-0.149^{***}	-0.101^{***}	-0.048^{***}
	(-7.30)	(-6.04)	(-2.68)
$FTA_{lag\ trend}$	0.065^{***}	0.049^{***}	0.017^{***}
	(24.53)	(23.12)	(7.28)
$FTA_{lead\ trend}$	-0.005	-0.003	-0.002
	(-1.61)	(-1.17)	(-0.81)
constant	-6.633^{**}	-2.996	-3.637^{**}
	(-2.49)	(-1.58)	(-2.34)
$FE_{i,t}$	Yes	Yes	Yes
$FE_{j,t}$	Yes	Yes	Yes
$FE_{i,j}$	Yes	Yes	Yes
N	246840	246840	246840
R^2	0.86	0.80	0.71

t statistics computed with robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: FE with linear trends up to 10 years of lead and 10 years of lag

dependent variable	log export	log EM	log IM
FTA_{ijt}	-0.387^{**}	-0.444^{***}	0.057
	(-3.32)	(-4.52)	(0.51)
$FTA_{lag\ trend}$	0.086^{***}	0.013	0.073^{***}
	(4.55)	(0.90)	(4.58)
$FTA_{lead\ trend}$	-0.044^{***}	-0.030^{***}	-0.014
	(-4.29)	(-3.85)	(-1.60)
$FTA_{ijt} \times fin_{it}$	0.058^{**}	0.087^{***}	-0.029
	(1.99)	(3.54)	(-1.03)
$FTA_{lag\ trend} \times fin_{it}$	-0.005	0.008^{**}	-0.014^{***}
	(-1.21)	(2.39)	(-3.55)
$FTA_{lead\ trend} \times fin_{it}$	0.012^{***}	0.008^{***}	0.003
	(4.16)	(3.80)	(1.51)
constant	-6.632^{**}	-2.995	-3.637^{**}
	(-2.49)	(-1.58)	(-2.34)
$FE_{i,t}$	Yes	Yes	Yes
$FE_{j,t}$	Yes	Yes	Yes
$FE_{i,j}$	Yes	Yes	Yes
N	246840	246840	246840
R^2	0.86	0.80	0.71

t statistics computed with robust standard errors in parentheses.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$