International Sourcing and Firm Learning: Evidence from Serbian Firms*

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Abstract

We quantify the impact of neighboring firms' importing experience on the decision to start sourcing inputs from new markets using merged customs and administrative data from Serbian firms. We find that firms are more likely to start importing from a new market if neighboring firms in the same industry and location have experience importing from that market and if those firms are increasing their imports over time. Further, our results support a distinction between imports and exports for the decision to enter foreign markets; unlike exports, import sourcing choices are not independent across countries. We find that imports across origins are substitutes, not complements. We also investigate origin-country and firm heterogeneity. Our results indicate that the impact of neighboring firms' importing experience is greater for source countries in the European Union market and for firms that are high productivity, foreign owned, and previous importers. Together, these findings suggest that a firm's spatial connections are an important contributor to its access to global markets as sources for inputs.

Keywords: Imports, Peer effects, Learning, Spatial spillovers

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1 Introduction

As production processes fragment and locate in different countries, firms are becoming both exporters *and* importers. Indeed, Bernard, Jensen, Redding, and Schott (2018) argues that research on international trade should focus on these "global firms" who are both exporters and importers. The literature has mainly focused on exporters by demonstrating that exporters are different, better – more productive, larger, more skill-intensive and pay higher wages (see for example, Bernard, Jensen, Redding, and Schott (2007)) – but the literature on importers is limited, albeit increasing in recent years. It is important to study importers as import participation and activities are strongly linked with firm productivity. Firms can import better quality inputs to improve their final products and a more diverse set of inputs to either substitute for or complement with domestic inputs. Importers can then achieve higher productivity, sales, and exports. Studies in several countries have shown that importing can increase firm productivity, such as in Indonesia (Topalova and Khandelwal, 2011), Chile (Kasahara and Lapham, 2013), France (Blaum, Lelarge, and Peters, 2018), and Hungary (Halpern, Koren, and Szeidl, 2015). Access to cheaper inputs also allowed Indonesian importers to increase worker wages. In addition, importers have smaller exchange rate pass-through (50 percent compared with non-importing firms); Amiti, Itskhoki, and Konings (2014) show that importers also have high export market shares and can move their markups in response to exchange rate shocks.

Compared to exporting, importing decisions are more complicated and involve more factors. Antras, Fort, and Tintelnot (2017) develop a theoretical framework to understand import decisions. They show that import decisions are interdependent across countries, as importing from one country can affect a firm's ability and decision to import from another market. Unlike exporting where the marginal cost of production is constant across export markets, the firm's aim in choosing the optimal set of import markets is to reduce costs. Hence the interdependence of the source-market set decision. Importing from a low-cost country can allow the firm to scale up production, thereby allowing the firm to incur the

fixed costs of sourcing from another country. Thus, source countries can be complements or substitutes, depending on the firm's demand elasticity. Using US data, Antras, Fort, and Tintelnot (2017) also present evidence that countries not only differ in the cost of inputs, which lowers production costs, but have different levels of fixed costs of importing.

Given the significance of the global sourcing decision for firms, it is noteworthy that there is substantial heterogeneity amongst otherwise similar firms in both the decision to source inputs internationally and the foreign markets that they choose to source from. One explanation for this variation is that the costs associated with initiating a new sourcing arrangement in a foreign market are not known with certainty by the firm and must be inferred from outside sources. In this context, one of the most valuable sources of information about foreign markets for a firm is neighboring firms' experiences in those markets. The empirical literature has found that these informal barriers to trade help explain the observed firm-level heterogeneity in exporting and that firms learn about foreign markets from neighboring exporters. The earliest studies of this effect found mixed results, for example, neither Aitken, Hanson, and Harrison (1997) nor Bernard and Jensen (2004) find evidence for export spillovers specifically. However, later research refined the scope of potential export spillovers to be market-specific, which is more aligned with international trade theories that feature heterogeneous firms (e.g., Melitz (2003)). Koenig (2009), Koenig, Mayneris, and Poncet (2010), and Fernandes and Tang (2014) find a strong learning effect for exports by using data that allow for a firm's neighbor set to be more specifically defined in terms of smaller geographic and industry groupings as well as more detailed customs data that allows for the measurement of market-specific spillovers. However, the focus of this literature evaluating how networks and information spillovers reduce informal trade barriers has been to explain heterogeneity in firms' export decisions. Papers on import learning are limited. However, Bisztray, Koren, and Szeidl (2018) bridges the gap by extending a framework most similar to Koenig, Mayneris, and Poncet (2010) to a panel of Hungarian firms that allows for an evaluation of the impact of managerial networks in addition to spatial connections.

One of the primary innovations in the literature on firm learning and exports has yet to be investigated in the context of the firm decision to import: establishing that the basis for information spillovers is that firm's knowledge of foreign markets is not known with certainty. It follows that firms learn about the characteristics of foreign markets, such as the quality of inputs, reliability of suppliers, and ease of importing, through the imperfect signals they receive from firms that currently engage internationally. Fernandes and Tang (2014) explicitly incorporate this into a model of the firm decision to export and show that it is not only important how many of a firm's neighbors export to a certain location, but also the success those neighboring exporters are finding in the foreign market. In this paper, we bridge this gap in the literature by combining the statistical learning framework for specifying the signal firms receive about foreign markets from their neighbors in Fernandes and Tang (2014) within the framework of the optimal sourcing decision as developed in Antras, Fort, and Tintelnot (2017).

Specifically, we study the effects of firm learning on firm sourcing strategies using firm-level panel data from Serbia. Our data combines information about firm characteristics with customs activities for all Serbian firms between 2006 to 2015. We find that market-specific import experience of firms in the same local area and industry increases the likelihood of a firm to start sourcing from that market. Given the detail of our data, we are able to estimate multiple specifications with broad sets of fixed effects. Specifically, we find that a one standard deviation increase in the log density of neighboring firms with experience importing from a specific market results in a 1.06 percentage-point increase in the probability of firm import entry into that market in a given year. Additionally, we find that a one standard deviation increase in the neighboring firms' signal about the profitability of sourcing from a market (as defined in Fernandes and Tang (2014)) results in a 1.15 percentage-point increase in the probability of import entry in a given year. The effect of the neighboring firms' signal is further magnified by the number of firms with import experience. Given the import premia we observe in Serbia, these results are economically significant and explain

part of the observed variation in source markets between Serbian districts. We also study the interdependence of sourcing decisions across markets that is implied by the optimal sourcing framework developed in Antras, Fort, and Tintelnot (2017). We find that additional import experience among a firm's peers in other foreign markets decreases the likelihood that the firm starts to source from a given market, suggesting that sourcing decisions across markets are substitutes in the firms optimal sourcing decision. Further, we evaluate the impact of origin country and firm-level heterogeneity on information spillovers with respect to entry into foreign sourcing markets. We find that the decision to source from a new market for Serbian firms is more impacted by the signals received from neighboring firms if the origin country is part of the European Union (EU) market. In addition, we find that lower productivity firms and firms that are new to importing make less use of the information signals they receive from neighboring firms about foreign markets.

This paper proceeds as follows. Section 2 provides context about importing firms in Serbia, including the fact that import activities have increased over time with institutional changes and the various import premia observed in Serbian firms. Section 3 characterizes how the firm learning framework and optimal sourcing strategy of Serbian firms is implemented quantitatively. Section 4 reports the empirical results on the impact of neighboring firm import experience on import entry. Section 5 concludes.

2 Importers in Serbia

Importers in Serbia have been growing in the last two decades. This trend is driven by the increasing stability of Serbia's trade relationships after the conflicts and wars in the region during the 1990s and early 2000s. In particular, Serbia signed a Stabilization and Association Agreement with the EU in 2009. This agreement begins the process of reform and harmonization towards EU standards and is the first step towards EU membership. More importantly for our purposes, Serbia initiated a liberalization of their import regime

for European exporters.[1] Since 2009, trade liberalization on the Serbian side has been following a gradual and predictable liberalization schedule and by 2013, most EU imports enter tariff-free. The EU is a main market for inputs for Serbian firms, and its importance is further amplified as European foreign direct investment locates in Serbia to produce for the European market, especially after this trade agreement came into force. One key example is the decision of Fiat, an Italian car manufacturer, to locate its worldwide production of the car model *Fiat500* in Serbia in 2010, which requires them to import components from many countries. Serbia also signed another trade agreement with its neighbors in the Western Balkans regions in 2006 but these markets are less important as input sources.

We show that Serbian importers are increasing in their intensive and extensive margins between 2006 and 2015, using data on Serbian firms from the Business Registries Agency (BRA) combined with data provided by the Serbian Customs Administration. Table 1 presents the total value of Serbian imports between 2006 and 2015 as well as the average imports of a firm-origin country pair and the total number of firm-origin country pairs. Over the period, all three measures are increasing, which suggests that the increase in total imports is due to both increases in the intensive margin (value of firms' imports from each of their source countries) and extensive margin (number of countries firms source from). Serbian firms are increasingly making sourcing decisions that cross international borders. The sourcing choice of the firm is significant because the basket of inputs and sources it chooses impact production costs, product quality, and subsequently the competitiveness of the firm. Both margins are incorporated in our empirical framework, which we describe in detail below. The increases in the intensive margin are incorporated into firm learning (with a lag, as in Fernandes and Tang (2014)) because changes in other firms' imports from a source act as a signal to the non-importers about the potential savings and quality of inputs from that source. Changes to the extensive margin, that is, firms entering into new source markets for their inputs, represent the outcome that our analysis seeks to explain through

[1] Customs duties for all industrial and agricultural products from Serbia were abolished by the EU in 2000 with the application of the Autonomous Trade Measures.

firm learning from neighboring firms' import experience.

Over the sample period (and the business cycle), the share of Serbian firms that import has varied, but has been steadily increasing since 2009 and as of 2015 nearly half of Serbian firms source inputs internationally (see Figure 1). The increase in the share of importers coincides with the strengthening in Serbia's trade relationships, especially with the EU. Among these importers, the EU market represents an increasingly important origin for sourcing inputs (see Figure 2). In part, this trend can be accounted for because the majority of new importing markets entered by Serbian firms are in the EU market (see Figure 3). However, the distribution of firms entering into new source markets is not uniform across Serbia and the share of entrants in EU markets is even more dispersed. In particular, while there is a geographic agglomeration of entry into importing (especially in the capital city, Belgrade, and the surrounding districts), the relative importance of the EU market for new sourcing connections varies across Serbian districts (see Figure 4).

We observe an import premia in Serbia, similar to the finding for US firms in Bernard, Jensen, Redding, and Schott (2018). We categorize the importers into three groups: non-importers ("never"), infrequent importers ("sometimes") and always importers ("always"). Infrequent importers are firms that import in some years but not every year. We demonstrate that firm characteristics are different across these groups and present the summary statistics in Table 2. We observe that Serbian firms that import from abroad, especially those that consistently source internationally ("always" importers), are larger in terms of revenue, employees, and foreign investment. On average, Serbian firms import about 36 million RSD from 1.6 different source markets each year. Further, on average about one of these source markets is an EU market. In terms of establishing input sourcing arrangements in new markets, on average a firm enters 0.526 new source markets each year of which a similar proportion are EU members.

3 Empirical Framework

In order to evaluate the effect of firm learning from neighbors about market-specific information when deciding to enter new foreign sourcing markets, we apply an empirical framework that combines the characterization of the firm's sourcing decision in Antras, Fort, and Tintelnot (2017) with a specification of uncertain knowledge about the characteristics of the foreign market for the firm that is similar to the one developed in Fernandes and Tang (2014). This framework will help explain the differences in import entry patterns within Serbia conditional on a wide set of fixed effects (e.g., district, source country, year).

3.1 The Firm's Entry Decision

We define entry into importing from an origin country in a way that is analogous to entry into exporting in Fernandes and Tang (2014),

$$Entry_{ikt} = \begin{Bmatrix} 1 \text{ if } m_{ik,t-1} = 0, m_{ikt} > 0 \\ 0 \text{ if } m_{ik,t-1} = 0, m_{ikt} = 0 \end{Bmatrix} \tag{1}$$

where $Entry_{ikt}$ is an indicator variable that is equal to one when a firm, i, imports from a foreign market (here, a country), k, in period t, but did not do so in the previous period $t-1$. Here, m_{ikt} and $m_{ik,t-1}$ are the value of imports by firm i from market k in period t and $t-1$, respectively. It follows from the definition of entry, that a firm can only enter into importing from a country, k, if it did not import from that market in the previous period ($m_{ik,t-1} = 0$). Over the set of all countries, $k \in J$, a firm, i, has a *sourcing strategy*, $\mathcal{J}_{i,t}$, that can be expressed as a set of indicator variables, $I_{ik} \in \{0,1\}_{k=1}^{J}$, that is equal to one if the firm sourced inputs from country k in period t and zero if it did not. Thus, a firm can only enter into a market, k, in period t, and is thus only considered a *potential entrant* for market k in period t, if $k \notin \mathcal{J}_{i,t-1}$.

When deciding whether or not to add an additional foreign market to its sourcing strat-

egy, the firm compares the potential increase in revenue from adding a new input source (which provides better cost-adjusted quality) with the fixed costs of setting up the sourcing arrangement. The benefits to the firm of adding an additional sourcing market for its intermediate inputs is a reduction in the firm's effective marginal cost of production and a resulting boost to profitability. In Antras, Fort, and Tintelnot (2017), the total impact of foreign sourcing on the effective marginal cost of a firm is the firm's *sourcing capability*. It follows that the *sourcing potential* of market k for firm i is the potential contribution of that foreign market to the firm's sourcing capability and is a function of the wages, technology, and trade costs associated with sourcing from that market for the firm. The benefits to the firm of entering a new input market, an increase in the firm's overall sourcing capability based on the new market's sourcing potential, must be larger than the fixed costs associated with initiating the new trade link, f_{ik}. If we let r_{it} represent the revenue of firm i in period t, then the firm will start to source from the foreign market k if and only if

$$r_{it}\left[Entry_{ikt}=1\right]-f_{ik}>r_{it}\left[Entry_{ikt}=0\right]. \tag{2}$$

Based on the derivation in Antras, Fort, and Tintelnot (2017), we assume that firm revenue, r_{it}, is a function of firm-level productivity, market demand for the firm's output, and foreign-market sourcing potential. However, in Antras, Fort, and Tintelnot (2017), the optimal sourcing strategy decision for their main specification is solely a function of firm-level productivity, i.e., for all firms in country g, the optimal set of markets for a firm of productivity φ to source from can be characterized as $\mathcal{J}_g(\varphi)$. However, such uniformity in firm sourcing decisions is violated empirically both across locations within Serbian and across Serbian firms in the same location. For structural estimation, Antras, Fort, and Tintelnot (2017) allow for heterogeneous fixed costs of importing to capture deviations in the sourcing set of otherwise similar firms. In our analysis, we seek to determine the role of information spillovers from neighboring firms in determining this heterogeneity and overall firm-level optimal sourcing strategies. To this end, we assume that foreign market characteristics,

and thus the sourcing potential of a foreign market, k, is not known with certainty by firms. This is analogous to the characterization of foreign market demand in Fernandes and Tang (2014), except that instead of each firm relying on its neighbors to determine the potential profitability of selling its outputs in a foreign market, k, each firm learns about the profitability of sourcing inputs by inferring from the foreign market from the experience of its neighbors that source from the market.

3.2 Neighbor learning variables

In order to incorporate learning into the firm's sourcing decision, we adapt the variable forms of neighboring firms' signals about foreign markets in Fernandes and Tang (2014) for imports. In this framework, the likelihood of a firm to enter a new foreign market depends on the strength of the signal about the market's sourcing potential inferred from neighbors' import experience, the precision of that signal based on the number of firms' experiences it represents, and the compounded effect of the product of the strength of the signal and its precision. Specifically, we define the firm's neighbors' signal as:

$$\Delta ln(m_{dskt}) = \frac{1}{n_{dsk,t-1}} \Sigma_{h \in N_{dsk,t-1}} \left[ln(m_{hdskt}) - ln(m_{hdsk,t-1}) \right] \tag{3}$$

The neighbors' signal variable captures the profitability of sourcing from a specific destination by calculating the average of growth in import volume, $ln(m_{hdskt}) - ln(m_{hdsk,t-1})$, by firms ($h$) in district d and industry s that imported from market k in both period t and in period $t-1$, i.e. continuing importers, such that this set of neighbors is defined as $N_{dsk,t-1}$ and the size of this set of firms is $n_{dsk,t-1}$. We do not include firms that move between districts and we only include firms that imported in both period $t-1$ and t, so changes in the neighbors' signal solely reflects the intensive margin of importing. In terms of the statistical learning model about the sourcing potential in the foreign market k that these variable definitions are built upon, the neighbors' signal reflects the information a firm has

about the level of the profitability that would be gained by entering the foreign market, but not the confidence with which the firm interprets this signal. The certainty with which the firm can apply to the signal it receives from its neighbors is captured by the density of importing neighbors variable defined in Equation 4.

$$Dens_{dskt} = ln(n_{sdk,t-1}/Area_d) \tag{4}$$

The density of importing neighbors is defined as the number of continuing importer neighbors from market k, district, d, and industry, s, per square kilometer (where the land area of a district, d, in square kilometers is $Area_d$).

In addition, the product of the neighbors' signal and the density of importing neighbors is included to capture any amplification effect on the signal by the precision of the signal. The social learning model suggests that signals will impact decisions more if the signal is derived from more sources.

3.3 Specification

We combine the firm learning framework for foreign market sourcing potential with the firm's entry decision in Equation 5.

$$\begin{aligned} Pr\left[Entry_{idskt}\right] =& \beta_0 + \beta_1[\Delta ln(m_{dskt}) \times Dens_{dskt}] + \beta_2 \Delta ln(m_{dskt}) + \beta_3 Dens_{dskt} \\ &+ \boldsymbol{Z'\beta} + FE + \epsilon_{idskt} \end{aligned} \tag{5}$$

where we capture the determinants of the profitability of sourcing from a foreign market k by incorporating the neighbor signal and density variables from above with controls for firm-level productivity, market demand, and any fixed components of foreign market sourcing potential. We implement multiple specifications of control variables ($\boldsymbol{Z}$) and fixed effects (FE) (as in Fernandes and Tang (2014)) to isolate the impact of information spillovers about

foreign sourcing potential.

Specifically, firm-level productivity is addressed with either a set of firm-level controls (such as revenue, age, capital-labor ratio, foreign ownership, etc.) or firm fixed effects. Further, home market demand, a determinant of the profit a firm would derive from increasing its sourcing capability by adding a new trading partner that is not connected with firm learning about foreign markets, is captured by the inclusion of district fixed effects in every specification. Any constant component of foreign market sourcing potential, such as a fixed and known transportation cost due to the distance, infrastructure, or historical ties, is captured with the additional inclusion of origin country fixed effects. Additionally, any variation in these fixed costs by district is captured by the fact that the district and origin country fixed effects enter as origin country-district fixed effects. We additionally control for different potential confounding effects in each specification. One example are market-year fixed effects, which control for foreign supply shocks, leaving the source of variation as a district's deviation from national mean import growth/importer density for the foreign market. Further, district-year fixed effects control for local policy and local demand shocks, which leaves as a source of variation deviations in import growth/importer density from district average for all markets. Lastly, in one specification we add firm-year fixed effects which captures any time-varying firm productivity shocks.

In terms of identification, we are estimating the different entry decisions of *potential entrants*. Firms that are continuing importers from a market are not included in the comparison group. Instead, non-importers from the foreign market, k, in both the last period, $t-1$, and current period t, are compared with firms that similarly did not import from k in $t-1$, but began to import from k in period t. In our data we observe 83,633 unique entries into sourcing by Serbian firms over the sample period. Our analysis captures the effects of neighboring firms' import experience on the likelihood a firm that does not source from a specific market starts to do so. In particular, we isolate the impact of firm learning by controlling for any fixed components of foreign market sourcing potential for firms in

industry n and district d. Thus, we isolate the impact on the likelihood a firm imports from a foreign market k due to revelations the firm has access to through updates to its neighbors experiences, specifically, changes in the level of imports and the number of their neighbors that import from a foreign market.

To be specific about the interpretation of each coefficient: β_2 captures the direct impact of neighbors' import growth on the probability of entry, β_3 is the direct effect of having a larger sample of neighbors' experience to draw on, and β_1 represents the amplification effect. The estimation of these coefficients on the probability of entry is implemented with linear probability model estimation to allow for the varying sets of fixed effects.

We additionally evaluate foreign market and firm characteristic heterogeneity in the effects of information spillovers on the decision of Serbian firms to enter new sourcing markets. For this analysis, the empirical specification is extended to include interaction terms between each component of the neighboring firms' signal and dummy variables, $H_{ik} \in \{0, 1\}$, that capture heterogeneity in k and i. This extended specification is defined in Equation 6.

$$\begin{aligned} Pr\left[Entry_{idskt}\right] =& \beta_0 + \beta_1[\Delta ln(m_{dskt}) \times Dens_{dskt}] + \beta_2 \Delta ln(m_{dskt}) + \beta_3 Dens_{dskt} \\ & \beta_4[\Delta ln(m_{dskt}) \times Dens_{dsck} \times H_{ik}] + \beta_5[\Delta ln(m_{dskt}) \times H_{ik}] \\ & + \beta_6[Dens_{dskt} \times H_{ik}] + \boldsymbol{Z'\beta} + FE + \epsilon_{idskt} \end{aligned} \tag{6}$$

In this specification, β_5 captures the difference in the effect of neighbors' import growth on the probability of entry between the two groups defined by H_{ik}, β_6 is the difference between the groups for the impact of having a more precise signal, and β_4 is the difference between the amplification effect for the groups. In terms of origin-country heterogeneity, we investigate if there is a difference between EU and non-EU markets for firm learning. The majority of entry into new sourcing markets by Serbian firms is with EU market members, so we define H_{ik} in this instance to be equal to zero if a sourcing market is part of the EU market and equal to one if it is not part of the EU market. We similarly construct indicator variables

and test for heterogeneity for a variety of firm characteristics. For each firm characteristic, a firm's categorization is determined based on the first year the firm appears in the business registry. The firm characteristics we consider are the size of the firm, the foreign ownership status of the firm, the productivity of the firm, and the new importer status of the firm. For the size of the firm, most Serbian firms are small, i.e., have less than 50 employees, so we test the difference between small and medium/large (more than 50 employees) firms. In terms of the foreign ownership status, we use a 10% foreign ownership stake as the cutoff for determining whether a firm is domestic of foreign. In Serbia, most firms are classified as domestic by this measure. For firm productivity, we calculate the revenue per worker for each firm as well as the median value of this measure in each year and categorize firms relative to the median. Thus, a firm is considered low productivity if its revenue per worker is below the median for Serbian firms. Finally, we define a firm as a new importer if it has no previous experience importing from any market. In the analysis section we test the heterogeneity in the effects of firm learning for each of these characteristics in separate regressions as well as in a single combined specification. For each of the characteristics described above, the share of total entries by Serbian firms into new foreign markets over the entire sample period is summarized in Table 3. As stated previously, most entries into new markets are for countries that are part of the EU. Additionally, most entries are observed in small firms, which also compose the majority of firms overall. The same is true for domestic firms. Firms with productivity above the median represent a disproportionate share of entries. Lastly, firms that have previous importing experience (from any foreign market) make up most of the entries into new markets in the data.

3.4 Data

Using data on 38,907 unique Serbian firms from the Serbian BRA we construct an unbalanced panel of 31,482 firms to include in the final analysis. The data includes balance sheet information of firms, for example, their revenue, capital, employment, age, and ownership.

We include firms that were active, and thus included in the business registry, in at least two years over the sample period (between 2006 and 2015). Further, we include firms that remained located in the same district for every entry in the business registry. We then combine this firm panel with transaction-level customs data provided by the Serbian Customs Administration. The higher frequency customs data is aggregated at the firm-level to reflect the imports of each firm by origin country on an annual basis. The firms are identified by a unique tax identification number that allows us to merge the balance sheet data with the customs data. In the main results, we restrict the set of import partners to the top 150 countries that Serbian firms source from (aggregating all firms) over the sample period.[2]

We define a firm's neighbors as firms in the same industry and district (importing firms are observed in 484 NACE 4-digit industries and all 25 districts).[3] We group firms by district in order to capture the geographic variation in sourcing choices observed in Serbia (see Figure 4). Similarly, since the combination of inputs a firm sources are dependent on its production process, grouping firms by NACE 4-digit industry to define neighboring firms ensures that only the neighbors with relevant experiences for firm learning are being included in the analysis.

While we define the signals a firm receives from its neighbors in an analogous manner to Fernandes and Tang (2014), it is important to note that, in contrast, we do not trim our panel to exclude firms that receive exceptionally strong or weak signals because we do not want to artificially censor the learning signal.[4]

[2]The set of import partners is restricted to the top 150 countries so that it was feasible to calculate the neighbor learning variables. The top 150 countries make up 99.6% of Serbia's import values.

[3]The district is equivalent to the smallest geographical unit, the Nomenclature of Territorial Units for Statistics (NUTS) level 3, used by the Eurostat. The average size of a Serbian district is $3100 km^2$. Excluding the two largest cities – Belgrade, the capital city, and Novi Sad – each district has about 100-200 thousand population.

[4]The results are robust to this decision and can be provided upon request.

4 Results

We begin the discussion of results with the baseline specification in Table 4. Each column includes a different set of fixed effects and firm control variables. All columns include origin country-district fixed effects. In addition, columns 1 and 2 include origin country-year fixed effects, and columns 3 and 4 include district-year fixed effects. In order to control for any unobservable firm characteristics, columns 2 and 4 also include firm control variables such as revenue, size, age and capital, and column 5 includes firm-year fixed effects. The difference between the results in columns 1 and 2 and columns 3 and 4 is that the first two columns control for any import shock emerging from the origin country (such as a positive supply shock) that can encourage more imports flows, while the latter two columns control for any demand shock emerging from the firm's district (such as an entrepreneurship program or government subsidy) that can encourage firms to import.

The results confirm our prior that the presence of importing neighbors and the signal received from them are positively correlated with the entry rate into importing and we find that they are statistically significant at the 1% level. The results hold across the different approaches in controlling for unobservable characteristics. The probability of import entry from a specific country is higher when there are more neighbors from the same industry importing from the country, the signal of importing such goods is higher, and this effect is compounded by the product of the signal and the number of importing neighbors around the firm. The inclusion of firm control variables and the firm fixed effects increases the magnitude of the variables of interest, suggesting that the unobservable firm characteristics have a downward bias on these regressors.

The results in column 5, which is our preferred specification, is used to interpret the impact of neighboring firm import experience on entry decisions. A one standard deviation increase in the log of importing neighbor density (or 1.30 units) is associated with a 1.06 percentage-point percent ($= 1.30 \times 0.00813 \times 100$) increase in the probability of import entry. The neighbor's signal has a slightly larger effect as a one standard deviation increase in the

log of neighbor signals (or 1.22 units) is associated with 1.15 percentage-point increase in the probability of import entry. The neighbor's signal is boosted when there is more of these importing neighbors around the firm: the probability of the firm entering into importing will increase by 1.11 percentage points with every unit increase in the interacted variable. The aggregate increase of 3 percentage-points in the probability of import entry for a specific market in a given year is economically significant given the baseline rate of entry into new import markets and the observed premium in revenue, wages, and foreign investment of firms that are engaged in foreign sourcing of inputs.

The models insights from Antras, Fort, and Tintelnot (2017) show that import decisions are interdependent: a firm's decision to import from one market will depend on whether it is optimal to import from another market. Thus, we investigate whether firms' decisions to import from a specific market are impacted by neighbors who are importing from other markets in Table 5. The neighbors here are defined as those importing from origin countries different from the market of a firm's entry. The probability of importing from an origin country is negatively associated with the density of neighbors and the signal from neighbors importing from other markets. The signal is further reduced with higher density of neighbors importing from other markets. A one standard deviation increase in the log of density of neighbors importing from other markets (1.66 units) is associated with a 7.5 percentage-point decrease in the probability of import entry into the market. A one standard deviation increase in the corresponding log of neighbor signal is associated with a 1.2 percentage-point decrease in the probability of import entry into the market. While the baseline results indicate that firms will learn about certain import markets from their neighbors, the probability of entering into that import market is also negatively affected by neighbors who are sourcing from other markets. This result confirms that import decisions are interdependent (Antras, Fort, and Tintelnot, 2017): a firm's decision to import from one market will depend on whether it is optimal to import from another market. In this case, firms are less likely import from a particular market as their neighbors' experiences imply the profitability of using alternative

sources of imports, which suggest that sources of imports are substitutes for Serbian firms.

We explore if the characteristics of the import market affects the baseline relationship between the density and signals from neighbors and the probability of import entry. An indicator variable is introduced into the regression to identify whether the firm and its neighbors are importing from EU or non-EU countries (column 1 in Table 6). Serbian firms are more likely to start importing from EU countries due to their geographical and political proximity,[5] and many EU countries are classified as high-income.[6] The results show that firms are learning more from neighbors that are importing from EU countries relative to non-EU countries. A one standard deviation increase in the density and signal of neighbors importing from an EU country is associated respectively with a 1.2 and 1.7 percentage-points increase in the probability of firm's import entry into that EU country. The probability of import entry is 0.15 and 1.1 percentage-point lower for the same increase in the density and signal of neighbors importing from a non-EU country. Serbian firms are learning more about EU import markets relative to other non-EU markets from their neighbors during the period of analysis because Serbia was opening its markets to the EU imports. The larger effect on the probability of import entry from the EU signal variable indicates that firms benefit from learning about these more advanced markets and the profitability of sourcing from them. This result is potentially driven by the difficulties in accessing EU markets, which have more sellers, sophisticated products, and complicated regulations, when compared to the most common non-EU markets entered by Serbian firms.

We also examine if there is heterogeneity in learning outcomes by firm characteristics: size, ownership, productivity, and importer experience. These characteristics capture the need or ability of the firms to use the information of source markets. The hypotheses are that large and foreign firms will have less need to rely on neighbors to learn about source markets; and less productive firms and new importers have low or no absorptive capacity to learn from

[5]Serbia was a province in the Austrian Habsburg empire in the 18^{th} century and there is still a large Serbia population in Austria.

[6]We find similar identical results when we include an indicator for high-income import partners due to the fact that high-income origin imports in Serbia mostly originate from the EU.

their neighbors. New importers are firms who are entirely new to importing from any market. These hypotheses follow a similar reasoning in the literature on firm heterogeneity in spillover effects of foreign direct investments,[7] which shows that the absorptive capacity of domestic firms affects how they learn from their foreign counterparts. These firm characteristics are introduced in the regression separately and the results are presented in columns 2 to 5 of Table 6.

We observe that medium and large size firms are only learning slightly more from their neighbors than small firms. The effects of the neighbors' density, signal and their interaction on small firms is presented in column 2 of Table 6. A one standard deviation increase in the density, signal and interaction term is associated with an increase in the probability of import entry for small firms by 1.0, 1.2, and 1.1 percentage points, respectively. The results are almost identical to the baseline results which is not surprising as small firms form a large proportion of Serbian firms. The results indicate that medium and large firms only learn more from their neighbors about the availability and certainty of import markets (the density variable) and not the profitability of using the imported inputs (the signal and interaction variables). The result is intuitive as medium and large firms are capable of determining and ensuring the profitability of using the inputs. These firms (i) can use their market power to establish good supply contracts (either in terms of ensuring quality or negotiating a low price) to make certain that using the inputs will be profitable, and (ii) have better capabilities to ensure that the inputs are used properly in their production processes.

The learning outcomes are also slightly stronger for foreign firms compared to domestic firms and are presented in column 3 of Table 6. Firms with a foreign ownership stake learn more about import markets from their neighbors than purely domestic firms. A one standard deviation increase in the neighbors' density, signal and their interaction can increase the probability of import entry for domestic firms by 0.9, 1, and 1 percentage point, respectively. The import entry decisions of foreign firms are more affected by their neighbors:

[7] See for example, Damijan, Rojec, Majcen, and Knell (2013)

the probability of import entry is about 0.9 percentage point higher than domestic firms with a one standard deviation increase in the three variables. However, the effect from the density variable is the most precise with statistical significance at the 1%-level. This result is intuitive as foreign firms, who are new to the country or region, are learning about the availability and certainty of import markets from their neighbors but less about the profitability. Similar to the result for larger firms, foreign firms do not need to worry about the profitability of using the inputs because they will have the market power to ensure a good supply contract and the internal capabilities to successfully incorporate the inputs into their production processes.

In contrast, low productivity firms are less affected by their neighbors than high productivity firms. The low productivity level is a proxy for firms' low absorptive capacity or weak management capacity, which captures their inability to absorb the knowledge and information from neighbors about the import markets. The results are presented in column 4 of Table 6. The density, the signal received from neighbors, and the interaction of these variables have a smaller effect on the probability of import entry for low productivity firms. Compared to effects of 1.4-1.6 percentage points increase on the probability of import entry for high productivity firms, a one standard deviation increase in the density of and signal from neighbors are only associated with 0.23 percentage points increase, and a similar increase in the interaction is only associated with 0.33 percentage points increase in the probability of import entry of low productivity firms.

Similarly, the import market entries of new importers are less affected by their neighbors than more experienced importers, which are presented in column 5 of Table 6. We remind the reader that these new importers are entirely new to importing. Compared to experienced importers, a one standard deviation increase in the neighbors' density and signal is associated with a 0.3 and 1.3 percentage points smaller effect on the probability of import entry for these new importers. There could be two reasons for the lack of learning outcomes for these importers. First, new importers may be smaller or less productive, and will have less

absorptive capacity to learn from their neighbors as we shown in previous heterogeneity analyses. Second, new importers will be less experienced with import procedures, often lacking the correct knowledge, manpower or internal business systems to handle the import process. They will have more barriers and costs to overcome before they start to import. Hence, in both cases, the knowledge and signals about import markets from their neighbors will not be as useful to them.

All the heterogeneity variables are included in the regression and presented in column 6 of Table 6. There is no change to the statistical significance and magnitude of the effects for each firm characteristic. This shows that each of the previously discussed effects operate independently of each other, with no two effects cancelling each other out when included simultaneously. The regression shows that learning from neighbors is most beneficial for the base group of firms – small, domestic, high productivity and experienced importers that are importing from EU markets. A one standard deviation increase in the density of neighbors is associated with a 1.3 percentage points increase in the probability of import entry. A corresponding increase in the signal from neighbors is associated with a 2.4 percentage points increase in the probability of import entry. The signal is boosted by the density of neighbors and the probability of import entry can increase by 2.3 percentage points if the interaction term increases by one standard deviation. This group of firms are precisely the type of firms that lack the resources to learn about import markets themselves (i.e., small and domestic), with the absorptive capacity to use the information (i.e., high productivity and experienced importers) and are learning about more complex markets in the EU.

5 Conclusion

In this paper, we use data on Serbian firms to estimate the impact of information spillovers on the decision to enter new foreign sourcing markets. Our framework combines the model of importing in Antras, Fort, and Tintelnot (2017) (which suggests sharp distinctions between

entry into importing and exporting) with the empirical literature on export market decisions. Specifically, our specification includes a firm statistical learning model (as in Fernandes and Tang (2014), but applied to imports) that distinguishes between the profitability signal a firm receives from its neighbors about a foreign sourcing market from the precision with which the firm considers the signal.

We find that experience importing from a market by firms in the district and industry increases the likelihood a firm starts sourcing from that market. Further, if these neighboring firms are increasing their imports from the foreign market over time, this signal also increases the likelihood for a firm to enter into importing from the market. Finally, we find that these two effects amplify one another, i.e., the signal firms receive about the profitability of importing from a market is more impactful is it is the result of a larger number of neighboring firms' experiences. These results are robust to a wide assortment of specifications with different fixed effects and control variables. Specifically, we find that the probability of firm import entry into a market in a given year increases by 1.06 percentage-points with a one standard deviation increase in the log density of neighboring firms with experience importing from that specific market and by 1.15 percentage-points with a one standard deviation increase in the neighboring firms' signal about the profitability of sourcing from a market. These effects are economically significant due to the large importer premia we observe and help to explain the observed heterogeneity in sourcing decisions of otherwise similar firms.

In addition, we investigate the interdependence of the decision to start importing across different foreign markets. We find that firms are less likely to start importing from a market if neighboring firms have more experience and are sending positive signals about other markets. Finally, we study the impact of origin country and firm-level heterogeneity on the strength of these information spillovers. We find that neighboring firms' import experience has a greater impact on the decision of a firm to import if the experience is from an EU-market country, has some foreign ownership, is a higher productivity firm, and has some previous experience

importing. We also find that this effect is similar whether a firm is small or medium/large. These effects suggest that local information spillovers are a critical factor in determining the access of firms to foreign input sources. The results could be used to improve the design of trade facilitation programs.

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Tables

Table 1: Imports in Serbia: 2006-2015

	Total Import Value	Average Value (per pair)	No. of Pairs
2006	659563	17.32	38080
2007	805712	18.12	44467
2008	1179246	22.36	52737
2009	886488	17.67	50158
2010	1113690	21.84	50992
2011	1229518	23.26	52852
2012	1329067	24.68	53857
2013	1317279	23.98	54941
2014	1378157	24.64	55936
2015	1460670	26.13	55901

Total import values are stated in Million Serbian Dinars (RSD).
Pairs are defined as a firm by origin country combination.

Table 2: Firm Characteristics by Frequency of Importing (2006-2015)

	Never	Sometimes	Always	Total
Revenue	59.77	232.7	1061.2	222.4
No. of workers	19.15	37.62	126.0	36.52
Foreign Own. Share	0.0252	0.120	0.183	0.0839
Value of Imp.	0	21.35	329.0	36.07
Value of EU Imp.	0	13.91	169.0	19.97
No. of Inter. Conn.	0	1.710	10.04	1.620
No. of EU Conn.	0	0.989	5.635	0.923
No. of New Inter. Conn.	0	0.695	2.381	0.526
No. of New EU Conn.	0	0.401	1.232	0.293
No. of New Non-EU Conn.	0	0.293	1.149	0.233
PRODY	0	20616.3	20782.4	11717.2
Differentiated	0	0.765	0.671	0.427
Observations	13609	15422	2451	31482

Import values are in terms of Million RSD.

All variables reflect firm-level average over sample period for each firm-country pair. Firms are categorized into three groups: non-importers (Never), infrequent importers (Sometimes), and consistent importers (Always).

Table 3: Share of new entries by characteristic

	Share of entries (%)
EU Partner	58.70
Non-EU Partner	41.30
Small Firm	86.07
Med./Large Firm	13.93
High Prod. Firm	69.15
Low Prod. Firm	30.85
Domestic Firm	79.17
Foreign Firm	20.83
Imported Before	78.07
New Importer	21.93

The reported share is the average share over the entire panel.

Table 4: Import Entry and Learning from Neighbors (Baseline)

	(1)	(2)	(3)	(4)	(5)
Log(Dens.) x Sig.	0.00110***	0.00160***	0.00135***	0.00190***	0.00117***
	(4.84)	(4.55)	(5.55)	(5.13)	(5.93)
Neighbors' Signal	0.00896***	0.0131***	0.0109***	0.0155***	0.00939***
	(5.01)	(4.72)	(5.71)	(5.31)	(6.06)
Log(Dens. Ngh.)	0.00356***	0.00492***	0.00352***	0.00489***	0.00813***
	(12.41)	(9.86)	(12.37)	(9.89)	(12.52)
Log(Revenue)		0.00879***		0.00872***	
		(13.39)		(13.33)	
Log(Age)		-0.00751***		-0.00753***	
		(-10.32)		(-10.30)	
Log(Wage Bill)		0.00531***		0.00533***	
		(4.28)		(4.29)	
Log(Num. Emp.)		0.00111		0.00116	
		(0.87)		(0.91)	
Log(Perm. Assets)		0.00104***		0.00104***	
		(5.55)		(5.53)	
Cap. Lab. Rat.		0.000000237		0.000000233	
		(1.25)		(1.23)	
Log(Dom. Sales)		-0.0974***		-0.0973***	
		(-15.70)		(-15.65)	
Foreign		-0.000395		-0.000383	
		(-0.58)		(-0.56)	
Observations	3099804	1930786	3099832	1930805	3090409

t statistics in parentheses

(1) and (2) feature (origin country)x(year) and (origin country)x(district) fixed effects

(3) and (4) feature (district)x(year) and (origin country)x(district) fixed effects

(5) features (firm)x(year) and (origin country)x(district) fixed effects

Entry is defined as in Equation (1) (s.e.s clustered (district)x(market))

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

Table 5: Import Entry and Learning from Neighbors (Oth. Orig.)

	(1) Entry	(2) Entry	(3) Entry	(4) Entry	(5) Entry
Log(Dens.) x Sig.	-0.00397***	-0.00597***	-0.00460***	-0.00685***	-0.00317***
	(-5.89)	(-5.28)	(-7.04)	(-6.24)	(-6.33)
Neighbors' Signal	-0.0318***	-0.0481***	-0.0368***	-0.0551***	-0.0248***
	(-6.18)	(-5.51)	(-7.41)	(-6.51)	(-6.70)
Log(Dens. Ngh.)	-0.00108***	-0.00242***	-0.00110***	-0.00244***	-0.0450***
	(-6.01)	(-11.44)	(-6.19)	(-11.64)	(-14.86)
Log(Revenue)		0.00992***		0.00986***	
		(13.97)		(13.92)	
Log(Age)		-0.00652***		-0.00652***	
		(-9.29)		(-9.26)	
Log(Wage Bill)		0.00484***		0.00486***	
		(3.85)		(3.86)	
Log(Num. Emp.)		-0.000337		-0.000279	
		(-0.25)		(-0.21)	
Log(Perm. Assets)		0.000780***		0.000786***	
		(4.11)		(4.12)	
Cap. Lab. Rat.		0.000000205		0.000000202	
		(1.09)		(1.07)	
Log(Dom. Sales)		-0.0993***		-0.0991***	
		(-15.44)		(-15.40)	
Foreign		-0.000994		-0.000991	
		(-1.42)		(-1.41)	
Observations	3040942	1903612	3040957	1903627	3036398

t statistics in parentheses

(1) and (2) feature (origin country)x(year) and (origin country)x(district) fixed effects

(3) and (4) feature (district)x(year) and (origin country)x(district) fixed effects

(5) features (firm)x(year) and (origin country)x(district) fixed effects

Entry is defined as in Equation (1) (s.e.s clustered (district)x(market))

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

Table 6: Import Entry and Learning from Neighbors [All Firms/By Industry Signal]

	(1) Non-EU	(2) Med./Large	(3) Foriegn	(4) Low Prod.	(5) New Imp.	(6) All
$Dens \times \Delta ln(m)$	0.00174***	0.00118***	0.00102***	0.00166***	0.00160***	0.00245***
	(6.37)	(5.67)	(5.75)	(5.85)	(6.00)	(6.72)
$\Delta ln(m)$	0.0140***	0.00946***	0.00813***	0.0132***	0.0128***	0.0195***
	(6.56)	(5.78)	(5.86)	(5.97)	(6.10)	(6.86)
$Dens$	0.00900***	0.00759***	0.00717***	0.0107***	0.00864***	0.0102***
	(13.37)	(11.91)	(11.61)	(14.09)	(13.76)	(14.46)
$Dens \times \Delta ln(m)$						
× Non-EU	-0.00116**					-0.00116**
	(-2.74)					(-2.65)
$Dens$ × Non-EU	-0.00937**					-0.00934**
	(-2.82)					(-2.73)
$\Delta ln(m)$ × Non-EU	-0.00180*					-0.00152*
	(-2.52)					(-2.20)
Non-EU	-0.0386***					-0.0355***
	(-4.57)					(-4.39)
$Dens \times \Delta ln(m)$						
× Med./Large		0.000100				0.0000247
		(0.17)				(0.04)
$\Delta ln(m)$ × Med./Large		0.000951				0.000292
		(0.21)				(0.06)
$Dens$ × Med./Large		0.0112***				0.0113***
		(12.80)				(13.17)
$Dens \times \Delta ln(m)$						
× For.			0.000953*			0.000817
			(2.23)			(1.95)
$\Delta ln(m)$ × For.			0.00795*			0.00688*
			(2.37)			(2.09)
$Dens$ × For.			0.00658***			0.00534***
			(14.03)			(10.94)
$Dens \times \Delta ln(m)$						
× Low Prod.				-0.00142***		-0.00123***
				(-4.77)		(-4.44)
$\Delta ln(m)$ × Low Prod.				-0.0113***		-0.00977***
				(-4.82)		(-4.48)
$Dens$ × Low Prod.				-0.00818***		-0.00771***
				(-19.36)		(-19.71)
$Dens$ x $\Delta ln(m)$						
× New Imp.					-0.00134***	-0.00135***
					(-3.57)	(-3.55)
$\Delta ln(m)$ × New Imp.					-0.0107***	-0.0107***
					(-3.59)	(-3.57)
$Dens$ × New Imp.					-0.00202*	-0.000974
					(-2.50)	(-1.24)
Observations	3090409	3090409	3090409	3090409	3090409	3090409

t statistics in parentheses
All specifications include (firm)x(year) and (origin country)x(district) fixed effects
S.E.s are clustered by (district)x(market)
Entry is defined as in Equation (1) (s.e.s clustered (district)x(market))
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figures

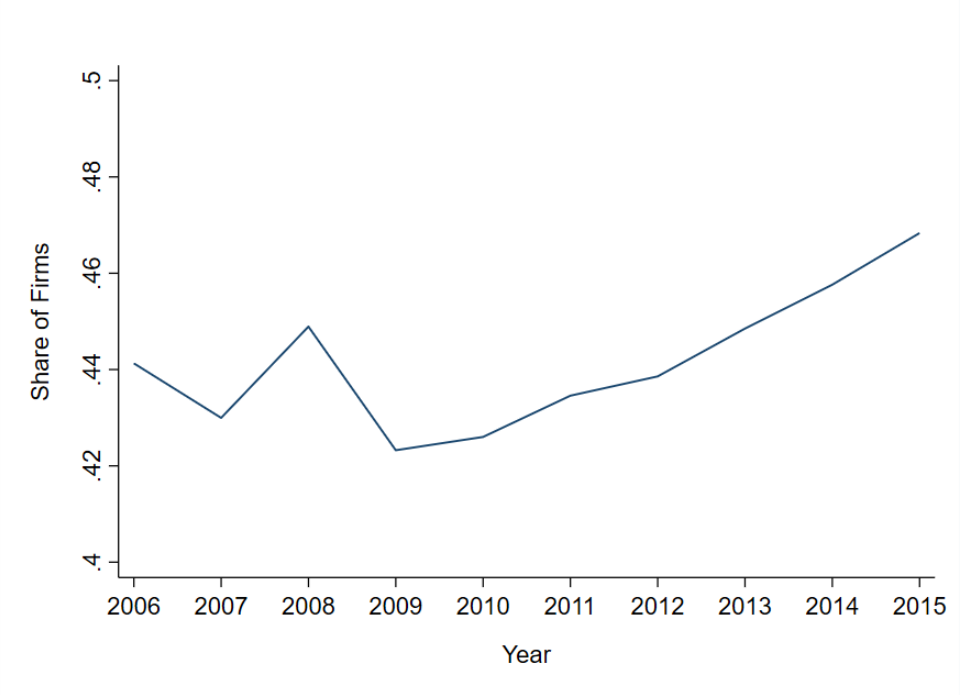

Figure 1: Share of Serbian firms that import

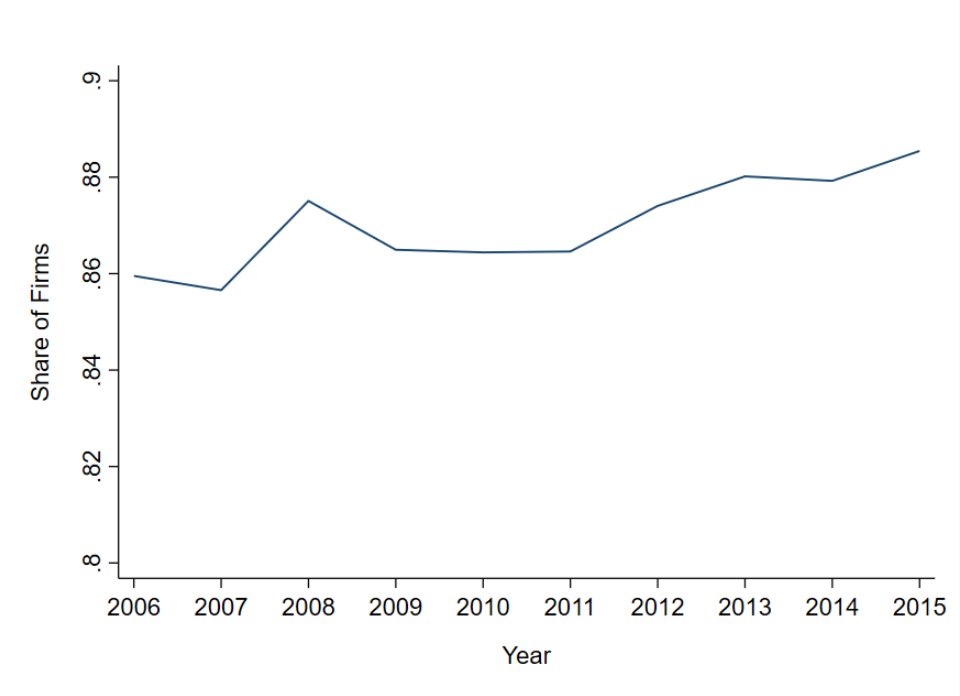

Figure 2: Share of Serbian importers that source from the E.U.

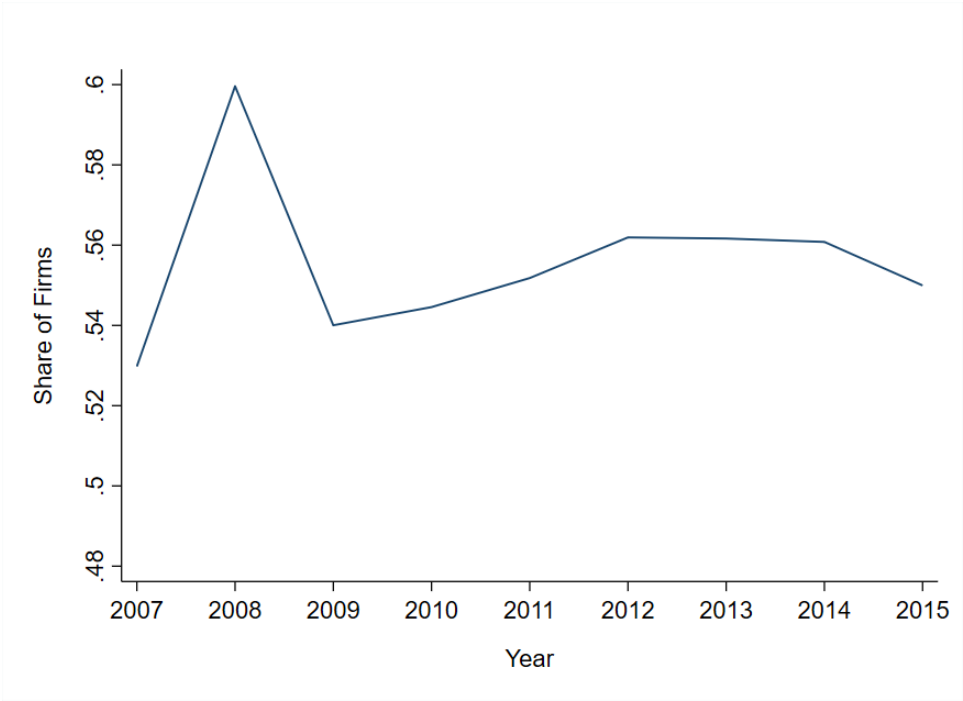

Figure 3: Share of new Serbian import connections to E.U.

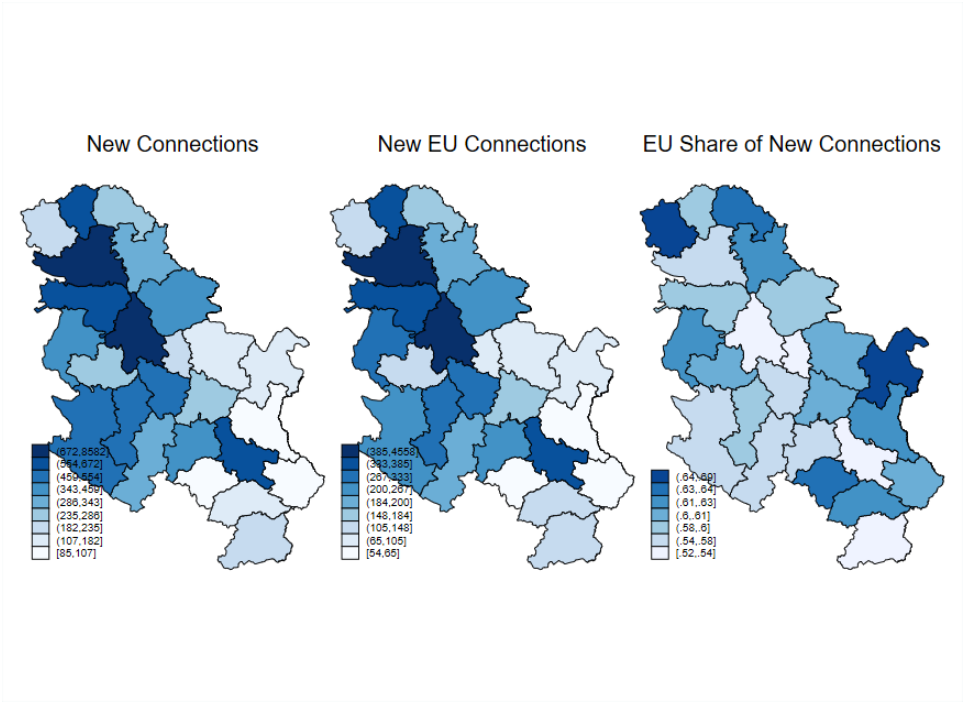

Figure 4: New Import Connections by District in 2012