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Expanding Empire and Spatial Distribution of Economic Activities: The Case of Colonization of Korea by Japan in the Prewar Period

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Abstract

After the First Sino-Japanese War and the Russo-Japanese War, Japan annexed Korea in 1910. We exploit this event as a natural experiment to investigate the effect of improved market access on the population growth. It is found that the tariff reduction raised the growth rates of population, and that the impact of the tariff reduction was significantly larger in the areas close to the removed border between Japan and Korea. As predicted by spatial economics theory, market proximity was indeed a determinant of the spatial distribution of economic activities. In the context of economic history, our findings suggest that it is important to reconsider the economic consequences of imperialism from the angle of spatial economics.

JEL classification: N45, N95, R12
Key words: Imperialism, Spatial economics, Economic geography, Economic History, Japan

1. Introduction

Rise and fall of the Japan Empire was one of the most remarkable events in the twentieth century history of imperialism. Japan annexed Taiwan, southern Sakhalin and Korea around the turn of the century through the Sino-Japanese War and the Russo-Japanese War. The Japan Empire expanded its control over the northern part of China and the Southeast Asia in the 1930s and 1940s, and then suddenly lost the acquired territories by the defeat in WWII. Military and political integration of these large areas into the Japan Empire gave a substantial impact on the economy of Japan itself as well as on the integrated areas. This paper explored how the annexation of Korea affected the Japanese economy.

In particular, we focus on the spatial distribution of economic activities in Japan. Market proximity has long been considered as one of the basic determinants of spatial distribution of economic activities in the theoretical literature of spatial economics. More specifically, market proximity has been supposed to give a positive effect on economic activities. However, in the empirical context, it is difficult to identify the effect of market proximity, because of endogeneity inherent to that concept. In recent years, Redding and Sturm (2008) addressed this issue by the natural experiment approach. They focused on division of Germany into West Germany and East Germany just after the WWII to interpret the division as a loss of access to the East Germany market for West Germany. As the German division was implemented by military and political reasons, this event can be regarded as exogenous to the economy. Based on this idea, using the division as a natural experiment, Redding and Sturm (2008) tested the theoretical prediction that the impact of the division would be larger in the areas closer to the new border between West Germany and East Germany. They found that the German division indeed gave a negative impact on the population growth of the cities close to the new border. In the same vein, some papers examined implications of market proximity, focusing on division of an economy or integration of economies (Brülhart et al. 2011; Ahlheldt et al. 2012; Nakajima 2008).

In this context, the rise and fall of the Japan Empire is an important subject to be explored. Nakajima (2008) focused on the independence of Korea from Japan in 1945 to examine the implications of market proximity, to find that cities in the western part of Japan close to the new border between Japan and Korea, suffered from a larger negative impact by the division, which is consistent with Redding and Sturm (2008).

This paper also focuses on the border change between Japan and Korea, but the direction of the change here is opposite to Nakajima (2008). Namely we exploit the event that Japan annexed Korea in 1910, as a natural experiment. After the annexation, the Japanese government and the Governor-General of Korea sequentially reduced the tariff barrier between Japan and Korea to integrate Korea into the Japanese trade area. This event provides an opportunity to investigate the implications of market proximity. If market proximity matters, areas closer to the previous border between Japan and Korea would enjoy a larger positive impact from the integration. Like the division and the unification of Germany after the World War II, the annexation of Korea can be regarded as a natural experiment exogenous to the economic variables.

An attractive feature of this event in this context is that we can use port-level trade data as well as city, town and village-level population data. While the existing literature use population as a proxy for the scale of economic activities, we observe economic activities more directly. As we will see later, the estimation results based on the trade data are not only consistent with those based on population data, but also with the sequence of economic integration.

The remainder of the paper is organized as follows. Section 2 describes the brief history of integration of Korea into Japan. Section 3 explains the theoretical framework and estimation strategy. In section 4, we present estimation results. Section 5 concludes the paper.

2. Integration of Korea into the Japan Empire

From just after the Meiji Restoration, influential politicians in Japan had the idea of integrating Korea under Japan's influence. However, two great powers in the Far East, namely China and Russia, also had keen interests in Korea. Indeed, Korea was the focus of political and military conflicts in this area in the late nineteenth and the early twentieth century. In this situation, Japan first excluded the influence of China from Korea through the Sino-Japanese War I (1894-95). Before the war, Korea had been a tributary country of China since the ancient period, but China admitted the independence of Korea by the Shimonoseki Peace Treaty in 1895. After that, especially after the Boxer Uprising in Northern China, the threat of Russia to Korea increased, which resulted in the Russo-Japanese War (1904-05). Through the Russo-Japanese War, Japan established its dominant position in Korea. Based on the position, in 1905 Japan made Korea a protectorate, supervised by the Resident-General (*Tokan-fu*) appointed by the Japanese government. Then finally in 1910, Japan formally annexed Korea, and established the Governor-General (*Sotoku-fu*) there. In other words, Korea became a colony of the Japan Empire, besides Taiwan and the southern part of Sakhalin (Unno 1995).

The principle of the Japanese government in colonizing Korea, was “assimilation,” that is, introducing Japanese institutions into Korea. In accordance with this principle, the Japanese government aimed to integrate Korea into its trade area; The same tariff rates should be applied to the commodities imported from foreign countries to Japan and Korea, while all the tariffs should be removed within this trade area in the Japan Empire (Kim 2002, pp.20-24; Yamamoto 1992, pp.3-62).

Before the annexation, the Korean government had agreements on tariff rates with several countries including Russia, U.K. and U.S., based on the partial trade treaties. In order to mitigate the antipathies of those countries to annexation of Korea, in August 1910, the Japanese government declared that the tariff system of Korea would be deferred for coming ten years, until August 1920. It is notable that the tariffs between Japan and Korea were included in this declaration as well (Kim 2002, p.30; Yamamoto 1992, p.69).

However, the Japanese government implemented some amendments to the Korean tariff system before 1920. The most important change was removal of the tariffs on rice and unhulled rice imported from Korea to Japan, in 1913 (Yamamoto 1992, p.70). Because rice was the largest commodity that Japan imported from Korea, the impact of this change was substantial. The data on the amount of the commodities imported from Korea to Japan, as well as the data on the amount of tariffs imposed on them, are available in the *Annual Return of the Foreign Trade of the Empire of Japan* (*Dainihon Gaikoku Boeki Nenpyo*). Dividing the tariff revenue by import amount, we have the average tariff rate. Figure 1 indicates the average tariff rate on the commodities imported from Korea, as well as the import amount. The impact of rice tariff removal is clearly reflected in this figure. The average tariff rate declined from 10.7% in 1912 to 3.6% in 1914, while the import increased by 1.9 times in this period.

Figure 1

In September 1920, when the declaration on the deferment of the tariff system expired, the Japanese government removed all the tariffs on the commodities imported from Korea. On the other hand, the tariffs on the commodities imported from Japan to Korea were not removed at that time, despite the expiration. This was because the Governor-General of Korea heavily depended upon import tariff revenue on commodities from Japan (Yamamoto 1992, pp.70-71). However, this unbalanced tariff policy was criticized by the Japanese diet, and as a result, in April 1923, all the tariffs on commodities that Korea imported from Japan were removed, except for the three items, alcohol, alcoholic beverage and fabrics (Yamamoto 1992, p.72). The proportion of those three items in the Korean import from Japan was not negligible, but the impact of this reform was substantial. Figure 2 indicates the average tariff rate on commodities imported from Japan to Korea. As we can see in this figure, average tariff rate declined from 5.68 % in 1922 to 1.32 % in 1924. Furthermore, the import tariff rate on fabrics from Japan was decreased from 7.5% to 5% in April 1927. As shown in Figure 1 and Figure 2, integration of Korea into the Japanese trade area, intended by the Japanese government since the annexation, was fairly achieved by 1924.

Figure 2

3. Theoretical background and empirical strategy

3.1 Theoretical Background

We follow Redding and Sturm's (2008) model, which builds on Helpman (1998). In this section we briefly present their model. Their model comprises $i \in \{1, \ldots I\}$ regions, two goods (manufacturing and housing), and two inputs (labor and land). The manufacturing sector needs only labor as an input for production, with increasing returns technology. The housing sector has a constant returns technology with inelastically supplied land input (H_i).

A representative consumer living in region i has a Cobb-Douglas preference on consumption for manufacturing goods C_i^M and housing services C_i^H, with a share of manufacturing goods μ. The sub-utility for manufacturing goods is of the constant elasticity of substitution (CES) form, with the elasticity of substitution among varieties (σ).

While housing services are not tradable, manufacturing goods are tradable among regions with iceberg transport costs. If one unit of the manufacturing good is shipped from region i to region j, only fraction $1/T_{ij}$ of the original unit actually arrives.

In this model, two indices of accessibility determine the characteristics of the equilibrium. *Market access* in region i ($MA_i \equiv \sum_j (w_j L_j)(P_j^M)^{\sigma-1}(T_{ij})^{1-\sigma}$) represents the accessibility to the demand market, where w_j is the manufacturing wage, L_j is the population, and P_j^M is the price index in region j. Market access is the transport cost-weighted sum of the demands for manufacturing goods in each region, adjusted by competition effect P_j^M. *Supplier access* ($SA_i \equiv \sum_j n_j (p_j T_{ij})^{1-\sigma}$) represents the accessibility to the sources of supply, where n_j is the number of manufacturing varieties produced in city j, and p_j is the corresponding price. Supplier access is the transport cost-weighted sum of supplies for manufacturing goods in region i.

Under this setup, in a long-run equilibrium, the population of labor in region i is an increasing function of market access:

$$L_i = \chi MA_i^{\frac{\mu}{\sigma(1-\mu)}} SA_i^{\frac{\mu}{(1-\mu)(\sigma-1)}} H_i$$

where χ is the composite of parameters. The transport cost is assumed to be an increasing function of distance. Therefore, the integration of two markets increases market access in regions near the border, and its effect diminishes according to the distance from the border.

The integration of two markets would increase market access of regions close to the border, leading to relative increase in the real wages in these regions. This would be accompanied by labor inflows into the concerned regions. However, such labor inflows would increase the housing rent, which would decrease the real wages in those cities, resulting in the real wages being equalized across all regions in the long-run equilibrium.

3.2 Data and Empirical Strategy

We use panel data on the population of 3851 Japanese municipalities (city, town, and village) for the years of 1913, 1920, 1925, and 1935. The distance between municipalities is measured by the great circle distance between centroids of municipalities obtained by historical GIS (Geographical Information Science) data. [1]

Using these data, we empirically investigate the hypothesis derived from the above theoretical model, which states that regions located close to the border show a relative increase in their population growth rates compared to the regions situated further from the border. We divide the Japanese regions into two groups: the border regions (treatment group) and non-border regions (control group). The Japanese regions located close to Korea are classified into the border regions, while the others are included as non-border regions. Following Nakajima (2008), we define the border regions as those located within 400 km of Pusan, which is the Korean city closest to Japan and has the busiest port in terms of trade between Japan and Korea. The boundary for the border region group is encircled in Figure 3. Pusan is located at the center of the circle that defines a distance of 400 km as its radius. The number of regions included as border regions is 542, while the rest (3309 regions) fall under the category of non-border regions.

[1] Murayama Laboratory in Tsukuba University.

Figure 3

We econometrically compare the population growth rates of these two groups by using the DD methodology. The estimation equation is as follows:

$$PopGrowth_{it} = \beta Border_i + \gamma(Border_i \times Integration_t) + d_t + \varepsilon_{it}$$

where $PopGrowth_{it}$ is the population growth rate in region i in period t; $Border_i$ is the border region dummy, which is one if city i is a border region; $Integration_t = 1$ if $t > 1945$; and d_t is the year dummy to control for common macroeconomic shocks.

Our primary interest is parameter γ. It captures the treatment effect of integration on the population growth rate of the border regions compared to that of the non-border regions. If we obtain the result that γ is significantly positive, it is indicative of a greater increase in the growth rate of the border regions than that of the non-border regions due to the integration of the Korean market; this is consistent with our theoretical prediction.

4. Empirical results

4.1 Impact on population distribution

Column (1) in Table 1 shows baseline results. Our primary interest is the coefficient of Border×Integration. It is positive and significant. This is consistent to the theoretical prediction. Also, the magnitude of the coefficient was large. Border regions have 0.4 percent point of annual population growth rate after integration. This implies that after the integration, border regions gains 6% increase in population relative to the other regions over the 15 years after the integration.

Another important consequence of the theoretical model is that small regions experience a greater integration effect than that experienced by large regions. Intuitively, this is because their own markets are relatively less important for small regions than the own markets are for large regions. In other words, the economy of a small region depends more on the markets in other regions than the economy of a large region does, and hence, the impact of the improved access to the Korean market was expected to be greater for small regions than for large regions.

To examine this prediction, Column (2) restricts the samples to the non-village regions that include the cities and towns, which are supposed to be large regions. In this specification, the coefficient of Border×Integration is positive, but not statistically significant. That is, there is no statistically significant integration effect for the non-village regions. On the other hand, Column (3) restricts samples to the villages, which are supposed to be small regions. In this specification, the coefficient of Border * Integration is positive and statistically significant. These results suggest that the economic integration affected population growth rate especially for the villages or small regions. This is consistent to the theoretical prediction.

Table 1

Because the driving force of the annexation of Korea was political and military matters, like the division and unification of Germany, economic integration and hence the determination of the border cities, can be assumed not to be correlated with the economic factors. But one may be concerned that there existed unobserved heterogeneity between the border regions and the non-border regions. For example, initial levels of industrialization would matter for the population growth after integration. To control such unobserved heterogeneity, we use a matching method. We choose samples of the non-border regions that are as similar as possible to the border regions in terms of their initial conditions. We match population in 1913, 1920, and the population growth rate from 1913 to 1920 by minimizing the difference between the border and non-border regions. Thus, we can compare the border and non-border cities that had similar initial population and population growth rate. The results are shown in Table 2. Column (1) shows the baseline, Column (2) shows the non-village, and Column (3) shows the village results. Even if we match samples, we obtain very similar results. The integration effects are robustly observed especially in villages.

Table 2

Further, our theoretical model implies that the treatment effects differ across locations. In order to observe such heterogeneity in the treatment effect, first, we estimate heterogeneous treatment effect by series of dummies for cities lying within cells 50 km wide at varying distances from Pusan, ranging from 250 to 500 km. We include these series of dummies and the interaction terms on the integration dummy to the estimation equation. The results are shown in Table 3. The coefficients of interaction terms for 0-250 km, 250-300 km, and 300-350 km are positive and significant at the 5% level. On the other hand, the coefficients of the interaction term for over 350 km are not significant. These results support our theoretical hypothesis.

Table 3

Furthermore, we test the heterogeneity on the treatment effects by the individual treatment effect by using the estimation equation given below:

$$PopGrowth_{it} = \sum_{j=1}^{N} \mu_j \eta_j + \sum_{j=1}^{N} \theta_j (\eta_j \times Integration_t) + \omega_{it}$$

where N is the number of regions and η_j is the region fixed effect. The parameter μ_j captures the mean population growth in region j before the integration, while θ_j captures the individual treatment effect of the economic integration. Figure 4 graphs the estimated individual treatment effect (θ_j) against the distance from Pusan.[2] We normalize the treatment effect such that the mean value is zero. Green solid line represents the results of fractional polynomials, and the dark region represents its 95% confidence intervals. The result of fractional polynomials has a peak in the region nearest to Pusan, then, gradually decline with the distance. These results support the theoretical implications that the integration of two markets increases populations in regions near the border, and its effect diminishes according to the distance from the border.

Figure 4

5. Conclusion

In 1910, Japan annexed Korea to integrate it into the Japan Empire. According to its assimilation policy of colonies, the Japanese government intended to remove tariffs between Japan and Korea, and this policy was almost realized by 1923, when tariffs on the commodities imported from Japan to Korea were removed except for alcohol, alcoholic beverage and fabrics. Reduction of the tariff barrier was supposed to improve market access between Japan and Korea.

We exploit this event as a natural experiment to investigate the effect of improved market access on the population growth and trade growth. It is found that the tariff reduction raised the growth rates of population and trade, and that it occurred only in

[2] To reduce the sample size, we randomly choose 30% observations from overall observations.

the areas close to the removed border between Japan and Korea. As predicted by the spatial economics theory, market proximity was indeed a determinant of the spatial distribution of economic activities. In the context of economic history, our findings suggest that it is important to reconsider the economic consequence of imperialism from the angle of spatial economics.

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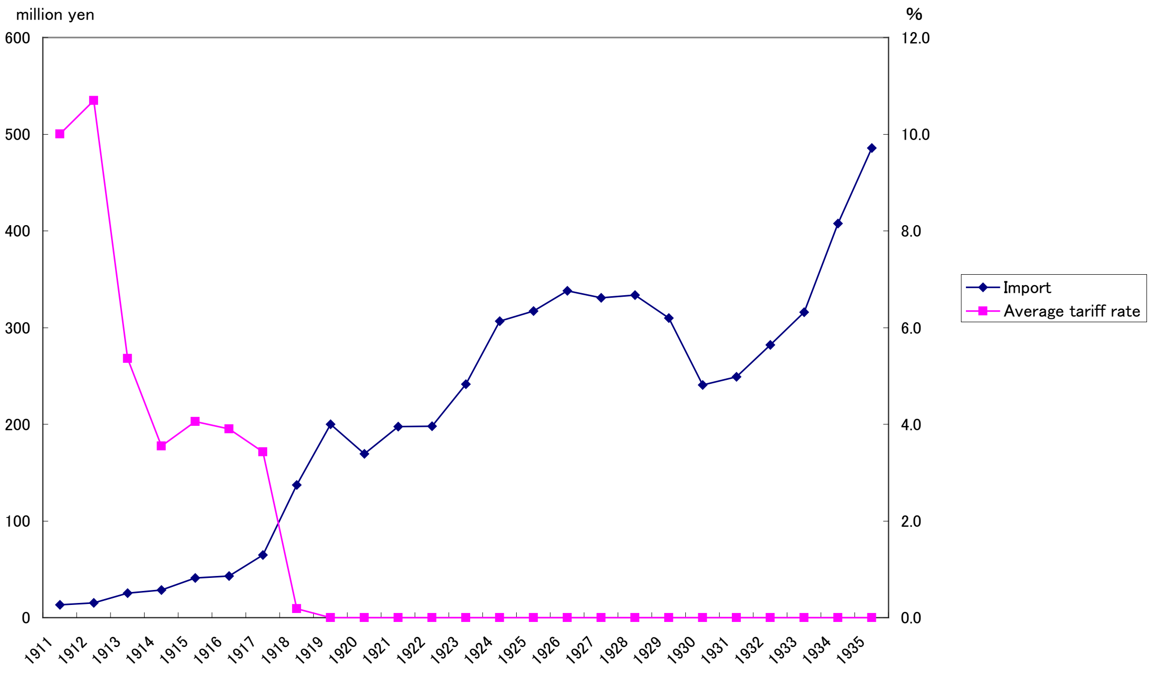

Figure 1 Import to Japan from Korea and average tariff rate

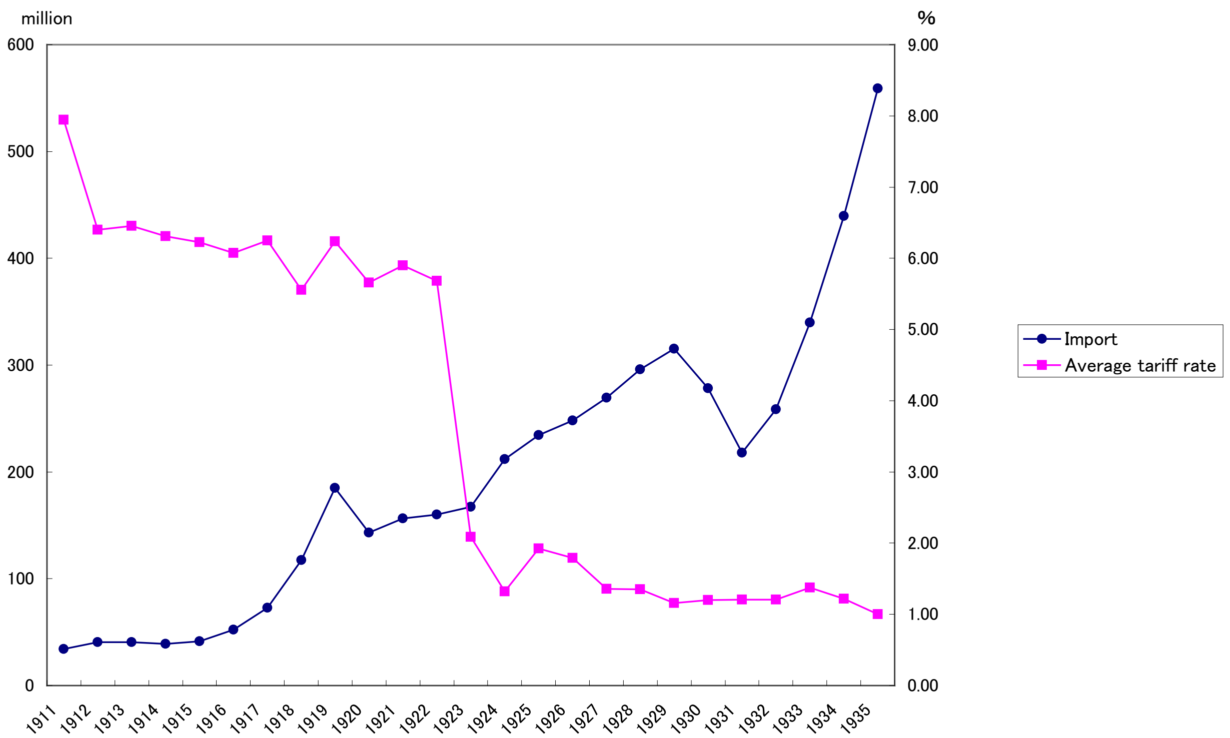

Figure 2 Import to Korea from Japan and average tariff rate

Figure 3 Map of Japan and Korea

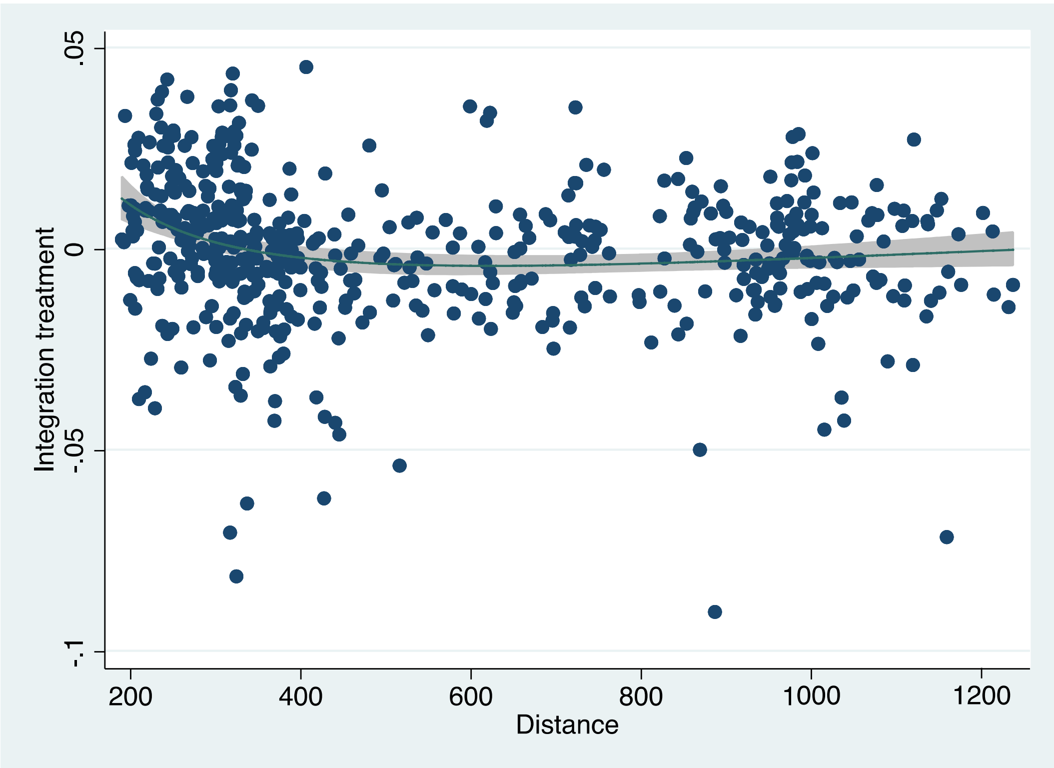

Figure 4 Individual treatment effects

Table 1 Baseline results

Dependent: Population growth rate	(1)	(2)	(3)
Border X Integration	0.00405**	-0.00325	0.00493**
	(0.000934)	(0.00486)	(0.000916)
Border	-0.00552**	0.000416	-0.00582**
	(0.000819)	(0.00470)	(0.000782)
Constant	0.00444**	0.0117**	0.00353**
	(0.000141)	(0.000519)	(0.000139)
Year FE	yes	yes	yes
Sample	All	Non-village	Village
Observations	19992	2061	17931
Adjusted R-squared	0.097	0.061	0.124

Table 2 Results after matching

Dependent: Population growth rate	(1)	(2)	(3)
Border X Integration	0.00518**	0.00639	0.00503**
	(0.00103)	(0.00519)	(0.00102)
Border	-0.00648**	-0.00714	-0.00593**
	(0.000947)	(0.00513)	(0.000912)
Constant	(0.000141)	(0.000519)	(0.000139)
Year FE	yes	yes	yes
Sample	All	Non-village	Village
Observations	6444	588	5856
Adjusted R-squared	0.129	0.060	0.142

Table 3 Results on distance cells

Dependent: Population growth rate	(1)	(2)	(3)
Border 0-250 km × Integration	0.00692**	-0.0000750	0.00772**
	(0.00172)	(0.00638)	(0.00179)
Border 250-300 km × Integration	0.00447**	0.00482	0.00482**
	(0.00124)	(0.00468)	(0.00128)
Border 300-350 km × Integration	0.00437**	0.00371	0.00471**
	(0.00115)	(0.00437)	(0.00120)
Border 350-400 km × Integration	-0.00165	-0.00613	-0.00103
	(0.00129)	(0.00494)	(0.00133)
Border 400-450 km × Integration	-0.00163	-0.00909	-0.000681
	(0.00186)	(0.00668)	(0.00193)
Border 450-500 km × Integration	0.00317	0.0175**	0.00137
	(0.00211)	(0.00474)	(0.00212)
Border 0-250 km	-0.00705**	0.000168	-0.00737**
	(0.00142)	(0.00564)	(0.00146)
Border 250-300 km	-0.00671**	-0.00649**	-0.00649**
	(0.00103)	(0.00325)	(0.00108)
Border 300-350 km	-0.00660**	-0.00374	-0.00662**
	(0.00107)	(0.00417)	(0.00111)
Border 350-400 km	-0.0000541	0.00470	0.0000387
	(0.00129)	(0.00391)	(0.00134)
Border 400-450 km	-0.00104	0.00230	-0.00132
	(0.00187)	(0.00722)	(0.00191)
Border 450-500 km	-0.00626**	-0.0244**	-0.00389**
	(0.00191)	(0.00590)	(0.00189)
Integration	0.0115**	0.0177**	0.0107**
	(0.000555)	(0.00137)	(0.000600)
Constant	-0.00780**	-0.00496**	-0.00820**
	(0.000509)	(0.00143)	(0.000545)
Year FE	yes	yes	yes
Sample	All	Non-village	Village
Observations	7896	717	7179
Adjusted R-squared	0.180	0.253	0.176