



# On the death of distance and borders: Evidence from the nineteenth century

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## ABSTRACT

We investigate time-dependent border and distance effects in the nineteenth century and document clear declines in these variables over time. This suggests that trade costs may have not declined as dramatically in the late twentieth century as has been supposed.

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## 1. Introduction

The process of commodity market integration has been an area of abiding theoretical and empirical interest. Long-standing deviations from the law of one price have been documented for a remarkably wide range of geographic areas and time periods. The literature on the topic has recently been reoriented, primarily due to the work of [Engel and Rogers \(1996\)](#) and [McCallum \(1995\)](#). The shared hypothesis of these two lines of research is that there is a marked effect of national borders, both in terms of heightened commodity price variation and diminished trade flows, which is registered in the data even after controlling for such things as distance and exchange rate volatility. At the same time, recent work in economic history has moved away from explaining cross-sectional differences in commodity market integration through the use of a relatively small number of explanatory variables. Rather, it has considered changes in commodity market integration over time through the use of variables capturing technological change in the transport sector, monetary regime choice, commercial policy, and warfare ([Jacks, 2005, 2006](#)).

This paper investigates time-dependent border and distance effects and documents clear declines in the importance of these variables in the nineteenth century. This finding is contrary to similar exercises for the late twentieth century, suggesting that advances in communication and transportation over the past 50 years may have

played less of a role in the present-day process of globalization than is commonly believed.

## 2. The death of distance and borders?

Since the work of [Cairncross \(1997\)](#), the notion of the “death of distance” has gained traction. Citing radical improvements in the cost and efficacy of long-distance communication, Cairncross depicts a world with free movement of goods, people, and ideas. Unfortunately, this prognosis has been difficult to identify in the present-day trade data. One of the first to recognize this fact was [Leamer and Levinsohn \(1995, p. 1387\)](#) who wrote “that the effect of distance on trade patterns is not diminishing over time. Contrary to popular impression, the world is not getting dramatically smaller”.

Taking this view as a starting point, a string of papers has strongly confirmed these results. [Berthelon and Freund \(2008\)](#) find corroborating evidence in highly disaggregated trade data, suggesting that distance-related trade costs have been on the rise in recent years, rather than falling as has often been assumed. Adding support to this view, [Carrère and Schiff \(2005\)](#) argue that a trade-weighted measure of the distance separating trade partners (or distance-of-trade) has been falling from the 1960s. Finally, [Disdier and Head \(2008\)](#) collect over 1000 estimated distance coefficients from 78 previous studies and perform a meta-analysis. Their results are rather stark: the estimated distance coefficient has been on the rise from 1950, suggesting that there has been an exaggerated sense of the death of distance.

Economic historians have also begun the search for time-variant border effects. Thus, for the nineteenth century, [Shiue \(2005\)](#) has

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investigated the implications for relative price volatility of the Zollverein, which eventually created a customs union from 39 politically autonomous German states in the 1830s and 1840s. Likewise for the twentieth century, Wolf (2005) has examined the impact of Polish reunification following the First World War on domestic trade flows. In both instances, the authors find that such historical “experiments” do indeed tend to ease trade frictions created at national borders. However, relatively little evidence has been brought to bear on the issue of variation in well-defined national borders in the long-run.

**3. Empirics**

The price data employed in this paper come from transactions in wheat markets for a set of over 100 American and European cities in the period from 1800 to 1913. The coverage of and sources for this data are detailed in Jacks (2005, 2006). From the perspective of the present-day, the choice of focusing on any one commodity—let alone wheat—may seem an odd one. After all, in 2000 the global wheat trade accounted for roughly 0.2% of the \$6.4 trillion in global exports. However, the situation was much different in the nineteenth century as trade in basic commodities predominated: even as late as the 1890s grains constituted fully 14% of the United Kingdom’s imports while a similar figure holds for grains relative to total exports by the United States in the same period. Thus, wheat markets seem to be a suitable benchmark by which to gauge commodity market integration during the first wave of globalization.

The basic explicantum of this paper will be the standard deviation of the logged relative price of wheat in cities *j* and *k* over a given time horizon, *T* (here, 132 months), or

$$V_{jkt}^{wheat} = St.Dev. \left[ \ln \left( \frac{p_{jt}^{wheat}}{p_{kt}^{wheat}} \right) \right]. \tag{1}$$

The reason for this choice of variables is relatively straightforward: it is widely used in the contemporary literature (Engel and Rogers, 1996), so the comparability of results looms large. Additionally, Anderson and van Wincoop (2004) have recently argued that this measure does a reasonably good job of capturing the level and variation of trade costs in simulations. An alternative measure, the mean of the logged relative price, is highly correlated ( $r=0.6997$ ) with Eq. (1) and yields materially the same results. Again, Eq. (1) is preferred for the purposes of this paper due to its ease of comparison with the contemporary literature.

Finally, a few words on the construction of the panel used in the following section are in order. First, the long nineteenth century was broken into eleven non-overlapping periods (1800–1810, 1810–1820, ..., 1890–1900, 1900–1910). Second, within a given country, all possible pair-wise combinations of domestic cities were formed and observations on relative price volatility were calculated. Finally, across countries, the price data for each country were matched with prices from a set of five cities (Bruges, London, Lwow, Marseilles, and New York City) which represent important international markets for wheat in the nineteenth century and for which data exists over the entire period, thus, allowing for a consistent means of comparison across time and countries. The resulting sample is almost evenly split between intra- and international observations. Figs. 1 and 2 depict the evolution through time of the price volatility measure given in Eq. (1).

The basic estimating equation is the following:

$$V_{jkt}^{wheat} = \alpha + \beta_1 \ln dist_{jk} + \beta_2 evol_{jkt} + \beta_3 border_{jk} + \sum_{t=1}^{T=11} \delta_t d_t + u_{jkt}, \tag{2}$$

where the dependent variable is time-variant and is defined as the relative price volatility between two cities *j* and *k* from Eq. (1). The

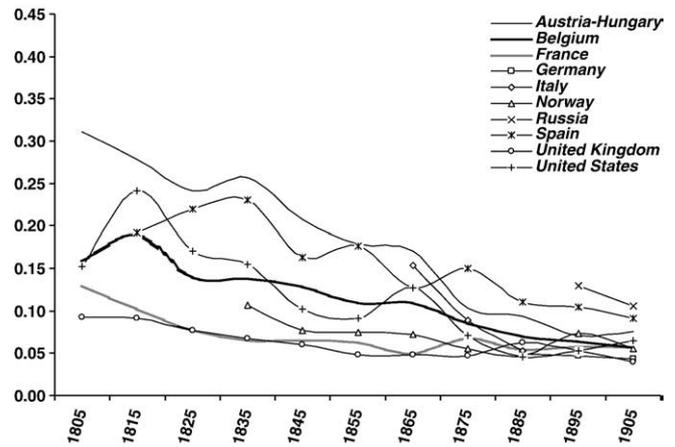


Fig. 1. Relative price volatility (domestic city-pairs).

second term on the right-hand side,  $dist_{jk}$ , refers to the distance separating cities *j* and *k* and is constructed as the sum of overland and oceanic distances (with the latter assumed to be zero for domestic city-pairs);  $evol_{jkt}$  is the standard deviation of the monthly changes in the logged nominal exchange rate between the currencies of countries *J* and *K* over the period, *T*;  $border_{jk}$  denotes the existence of a border between cities *j* and *k*; and the  $d_t$  terms are time fixed effects for the eleven sub-periods under consideration. Thus, we expect relative price volatility to be increasing in distance, nominal exchange rate volatility, and the presence of national borders.

Table 1 presents the results of this benchmark estimating equation employing four different specifications: country, city, country-pair, and city-pair fixed effects. Thus, any city or city-pair specific shocks—such as weather—are assumed to be orthogonal to the three independent variables and, thus, captured in the error term. Given that distance and the existence of a border are time-invariant while nominal exchange rate volatility is defined at the country-level, neither of these assumptions seem to be unduly onerous. In any case, the coefficients are precisely estimated, and their signs conform with the priors given above.

Table 2 presents the first round of results on border and distance effects through time. The basic estimating equation underlying these results is that of column (2) in Table 1, i.e. city and time fixed effects are included. Here, only the time-interacted distance and border effects are reported. Column (1) of Table 2 documents a secular downward trend in estimated border effects. Indeed, the border effect in the period 1900–1910 is estimated to have been nearly 90% less than that of 1800–1810. However, the reduction in the estimated

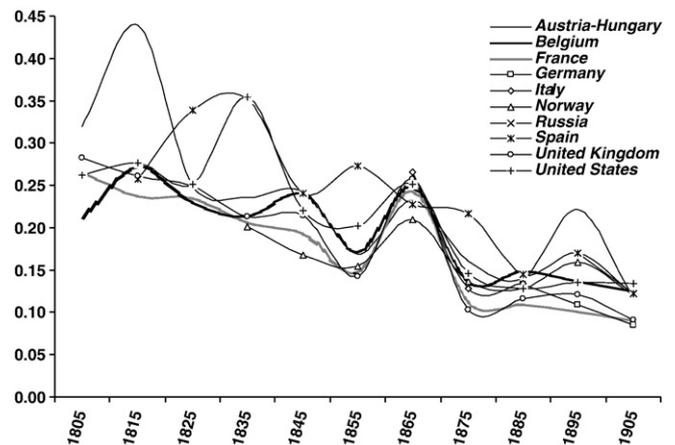


Fig. 2. Relative price volatility (international city-pairs).

**Table 1**  
Benchmark results.

Dependent variable in all regressions: standard deviation of logged relative prices				
	(1)	(2)	(3)	(4)
	Country fixed effects	City fixed effects	Country-pair fixed effects	City-pair fixed effects
Distance	0.0235 (0.000)	0.0178 (0.000)	0.0210 (0.000)	
Exchange rate volatility	0.6886 (0.000)	0.7176 (0.000)	0.6444 (0.000)	0.7486 (0.000)
Border	0.1223 (0.000)	0.0386 (0.000)		
Time fixed effects?	Yes	Yes	Yes	Yes
N	5663	5663	5663	5663
R-squared	0.901	0.914	0.848	0.873

NB: Estimation by ordinary least squares with heteroskedastic/auto-correlation consistent statistics; coefficients on fixed effects suppressed; *p*-values reported in parentheses.

effect was unevenly spread throughout the nineteenth century. In this regard, the period from 1870 to 1880 clearly stands out as a breakpoint in the series, and perhaps unsurprisingly so, as this period coincides with the mass adoption of the gold standard, very limited outbreaks of interstate warfare, relatively liberal commercial policy, and remarkably low nominal exchange rate volatility.

Likewise, column (2) of Table 2 demonstrates that the effect of distance on relative price volatility was also substantially diminishing over time with the estimated distance effect in the period 1900–1910 being more than 83% less than that of 1800–1810. And again, most of the gains in this regard seem to be concentrated later in the period with 1870 clearly marking the transition.

In Table 3, a different exercise is explored, namely the differential effects of overland and maritime distances. Distance is here calculated intranationally as the linear distance between two cities and calculated internationally as the sum of the linear distance to the nearest port and the trade-route specific (and nonlinear) distance between departure ports reported in Philip (1935). Thus, international distances can be fully separated from the intranational component, leaving us with a proxy for both distance and the border effect. The results in this instance are telling. The coefficients on intranational distances, after climbing throughout the first half of the nineteenth century, gradually fall in the period after 1860, reaching a level in 1900–1910 which is roughly 63% of the 1800–1810 value. The

**Table 2**  
Border and distance effects.

	(1)	(2)
	Time-interacted border effects	Time-interacted distance effects
1800–1810	0.0643 (0.000)	0.0252 (0.000)
1810–1820	0.0465 (0.000)	0.0228 (0.000)
1820–1830	0.0747 (0.000)	0.0298 (0.000)
1830–1840	0.0784 (0.000)	0.0390 (0.000)
1840–1850	0.0651 (0.000)	0.0320 (0.000)
1850–1860	0.0247 (0.000)	0.0262 (0.000)
1860–1870	0.0767 (0.000)	0.0337 (0.000)
1870–1880	0.0145 (0.001)	0.0074 (0.000)
1880–1890	0.0225 (0.000)	0.0088 (0.000)
1890–1900	0.0065 (0.134)	0.0018 (0.213)
1900–1910	0.0065 (0.098)	0.0042 (0.001)
Time fixed effects?	Yes	Yes
N	5663	5663
R-squared	0.921	0.925

NB: Estimation by ordinary least squares with heteroskedastic/auto-correlation consistent statistics; coefficients on city and time fixed effects suppressed; *p*-values reported in parentheses.

**Table 3**  
Intra- and international distance effects.

	Intranational distance		International distance	
1800–1810	0.0215 (0.001)		0.0163 (0.001)	
1810–1820	0.0356 (0.000)		0.0241 (0.000)	
1820–1830	0.0248 (0.000)		0.0201 (0.000)	
1830–1840	0.0522 (0.000)		0.0406 (0.000)	
1840–1850	0.0420 (0.000)		0.0317 (0.000)	
1850–1860	0.0653 (0.000)		0.0435 (0.000)	
1860–1870	0.0358 (0.000)		0.0285 (0.000)	
1870–1880	0.0101 (0.000)		0.0025 (0.219)	
1880–1890	0.0058 (0.015)		0.0004 (0.847)	
1890–1900	0.0049 (0.053)		−0.0027 (0.174)	
1900–1910	0.0080 (0.000)		0.0001 (0.971)	
Time fixed effects?	Yes			
N	5663			
R-squared	0.928			

NB: Estimation by ordinary least squares with heteroskedastic/auto-correlation consistent statistics; coefficients on city and time fixed effects suppressed; *p*-values reported in parentheses.

coefficients on international distance remain somewhat—but not radically—smaller than those on intranational distances and trace essentially the same course as those on intranational distances from 1800 to 1870. The period after 1870, however, witnesses their absolute collapse. Indeed, the coefficients become very small in magnitude and statistically indistinguishable from zero.

Running parallel to these results, Flandreau (1995) finds a sharp decline in the distance coefficient in a standard gravity model of European trade flows in the period between 1870 and 1880. Thus, the coincidence of declining (absolute) values for the distance coefficients on both relative price volatility and trade flows in this period allows for a plausible story in which the amelioration of nominal exchange rate volatility, commitment to the gold standard, and the spread of communication/transport networks lowered trade costs, and thus, stimulated trade flows.

#### 4. Conclusion

In this paper, we investigate time-dependent border and distance effects in the nineteenth century and document clear declines in the importance of these variables through time. What this suggests, in light of the work for the post-1950 era, is that researchers might have correctly identified the increasing effect of distance on bilateral trade over time. In other words, trade costs may have not declined nearly as dramatically in the late twentieth century as has been supposed, especially in light of the nineteenth century, a time of documented trade cost decline and commodity market integration.

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