# The erosion of colonial trade linkages after independence

Keith Head, Thierry Mayer, John Ries

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**Abstract**

The majority of independent nations today were part of empires in 1945. Using bilateral trade data from 1948 to 2006, we examine the effect of independence on post-colonial trade. On average, there is little short run effect of trade with the colonizer (metropole). However, after three decades trade declines more than 60%. We also find that trade between former colonies of the same empire erodes as much as trade with the metropole, whereas trade with third countries exhibits small and unsystematic changes after independence. Hostile separations lead to larger and more immediate reductions. Trade deterioration over extended time periods suggests the depreciation of some form of trading capital such as business networks or institutions.

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# 1 Introduction

The dismantling of European empires after World War II led to sweeping changes in the governance of developing countries in Africa and Asia. Recent research in economics has investigated the long-run consequences of colonial rule. La Porta et al. (1998) argue that the British endowed their colonies with a legal system that produces superior economic outcomes. Acemoglu et al. (2001, 2002) find that colonizers were more likely to establish pro-growth institutions in sparsely populated areas with lower settler mortality. Banerjee and Iyer (2005) find that 50 years after India abolished land revenue systems imposed in the mid-19th by British rules, their "institutional overhang" can be seen in agricultural productivity differences. In this paper, we investigate a different legacy of colonial rule: the bias in post-colonial bilateral trade patterns.

Algeria's trade with France offers *prima facie* evidence of large post-colonial trade erosion. In 1962, the year of independence, Algeria accounted for 8.84% of French imports, a share that had been stable over the 14-year period preceding independence for which we have data. The share fell by two thirds over the next two decades (to 2.72% in 1984) and another two thirds over the succeeding two decades, reaching 0.96% in 2006. A variety of potential explanations for this fact suggest themselves. First, it might reflect poor economic performance over the last four decades by Algeria, which may have reduced its exports to all markets. Second, Algeria's abandonment of the Franc in 1964 may have raised currency transaction costs. Third, France's participation in GATT and the European Community probably redirected its import purchasing patterns, lowering the share taken by any absolute level of imports from Algeria. Fourth, deterioration of business networks and trade-creating institutions may have raised bilateral trade costs.

Utilizing data encompassing almost every country in the world from 1948 and 2006, we identify the impact of independence based on within variation in bilateral trade. We estimate a semi-parametric specification, dividing years since independence into seven

intervals. Unlike the work cited in the opening paragraph, we will take as a given any changes in per capita incomes caused by changing *internal* institutions. We also control for *formal external* institutions (membership in regional trade agreements, GATT, and currency unions). This allows us to focus on the effects of unobserved *informal external* institutions such as the business networks emphasized by Rauch (1999).

Our results show that three decades after independence, trade between colony and metropole has fallen by more than 60%. Trade between colonies of the same empire falls even more. There is little evidence of corresponding diversion of trade to other countries. We also investigate the mechanisms that underlie the post-independence erosion of trade with the metropole. We exploit a data set showing the number of French nationals living in different countries which we consider as a proxy for the metropole's social and business network. We find the population of French expatriates in former colonies declines in much the same way as bilateral trade. The shrinking expatriate presence partially explains the diminished trade between France and its former colonies. An alternative explanation of falling trade after separation is that wars of independence caused permanent trade-reducing antipathy between the metropole and former colony. Categorizing independence events into amicable and hostile separations, we find that the latter are more immediately destructive to trade but both lead to large trade erosion in the long run.

Countries in colonial empires choose if and when to separate, raising the concern of endogeneity bias. As we discuss in Section 2, historical accounts suggest a significant random component to independence events. Nevertheless, systematic determinants of independence are a possible source of bias. The political and economic attributes of the colonizer (metropole) and colony, as well as the strength of their bilateral association, may affect the likelihood of independence. We remove these factors, however, in specifications that eliminate time-varying country effects and non-time varying bilateral effects. Time-varying bilateral effects remain as a potential source of bias. For example, declining

trade prospects may have induced metropoles to relinquish control of colonies. We will argue that our results showing little short-run and substantial long-run bilateral trade erosion subsequent to independence do not support this reverse causation hypothesis. Instead, they are consistent with the proposition that independence led to deterioration of trade-creating capital such as institutions and networks.

The paper proceeds as follows. In the next section, we describe our panel of independence events and bilateral trade data. Section 3 specifies a gravity model employing country-pair (dyad) fixed effects. Due to the computational difficulties of estimating country-year fixed effects to capture multilateral resistance terms, we eliminate them by implementing a method of "tetrads" that takes the ratio of ratios of trade flows. Our results on the impact of independence on bilateral trade are presented in section 4. The concluding section summarizes and discusses potential welfare implications.

# 2 Data on independence and trade

The principal variable of interest is the timing of independence events. We do not consider the end of a military occupation as being sufficient condition for an independence event. Thus France does not become independent from Germany in 1945 in our data set. Rather, independence arises following a *colonial* period which should involve long-term, civilian administration that includes significant settlement. Information on colonial relationships comes from a variety of sources but we used the CIA World Factbook as the primary authority for independence dates.

There are 253 country pairs with colonial histories, of which 33 remain current. Figure 1 displays the number of countries that gained independence since 1900, a total of 174.[1] The two main colonizers in this sample, the UK and France, are shown in red and

[1]Table 4 in the data appendix lists independence events since 1900 as well as the continuing colonial relationships for which we have trade data.

Figure 1: Independence events since 1900

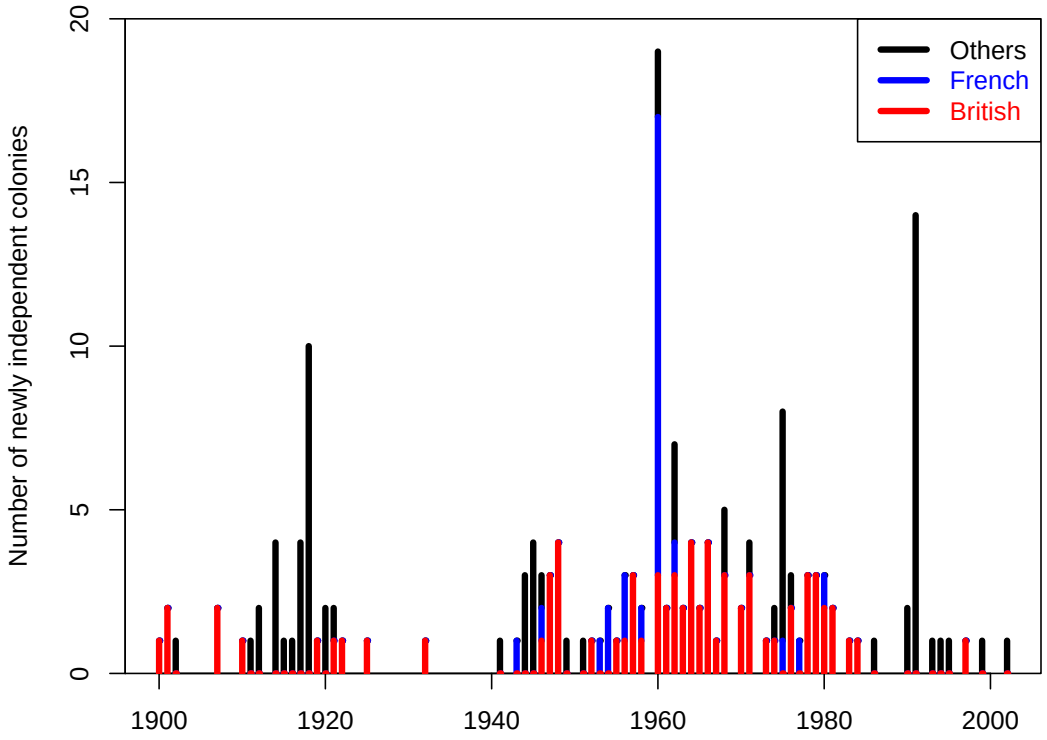
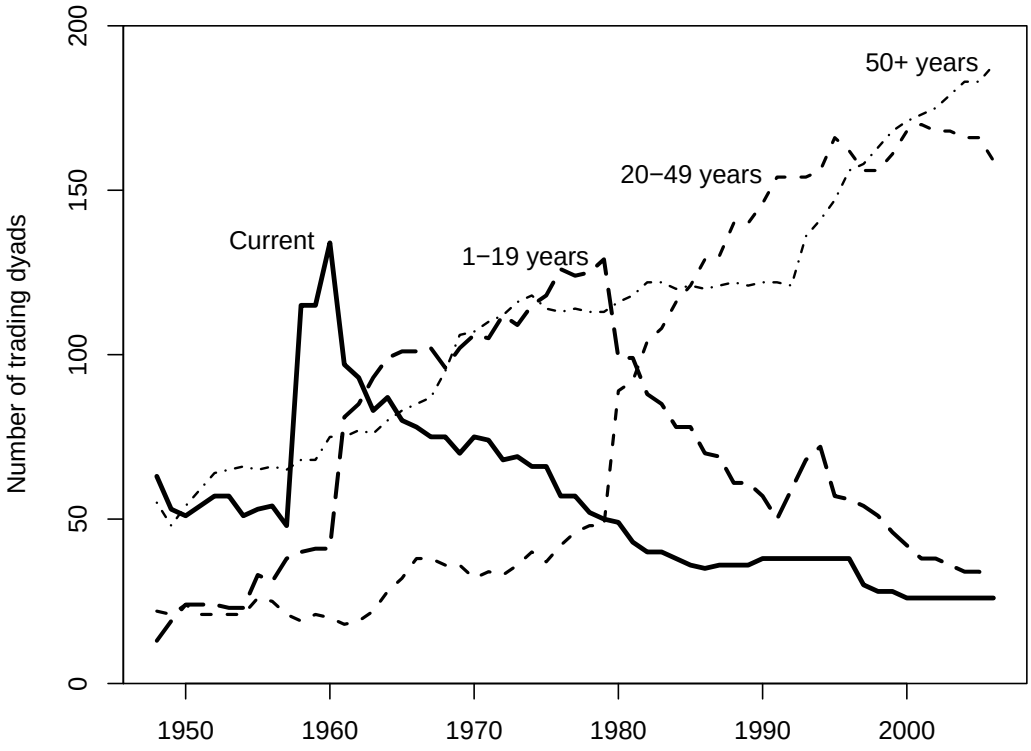



Figure 2: Frequency of trade links by years since independence



blue, respectively, with all others grouped and represented as black bars. The two highest black spikes correspond to the possessions lost by the defeated nations after World War I and the dissolution of the Soviet Union in 1991.

The timing of the independences shown in Figure 1 reflect a variety of political and economic forces. Historical accounts point to an important role for idiosyncratic events. For example, France's President De Gaulle first threatened to cut ties (and aid) to African colonies that voted to leave the "French Community." However, after Guinea declared sovereignty in 1958, De Gaulle reversed position and offered economic cooperation agreements to all countries that voted for independence. Fourteen colonies promptly gained independence in 1960. Rothermund (2006, p. 153) remarks that "in 1960 the French almost had to impose independence on a reluctant Gabon" because De Gaulle "did not tolerate exceptions to the granting of independence in 1960." This was despite oil and uranium resources that "the French were interested in keeping under their control." In contrast to the wave of independence for French colonies in the 1960s, Portugal adamantly clung to its five "overseas provinces" in Africa until after the Salazar dictatorship was replaced with a democratic and pro-decolonization government in 1974.

To estimate the influence of the independence events on bilateral trade, we use the International Monetary Fund's *Direction of Trade Statistics* (DOTS). It covers the 1948–2006 period, which is of crucial importance, since this includes pre-independence trade for many countries, as well as the immediate years following independence. While DOTS lacks data on trade for individual goods, it is the only data set containing a panel of worldwide bilateral trade that goes back far enough to study the main independence events of the twentieth century.

The DOTS often reports two values for the same flow from country $A$ to $B$. This is because country $A$ may report its imports from $B$ and country $B$ reports its exports to $A$. Import reports (from country $A$) are deemed more reliable since governments track

them closely because they are subject to customs duties (and other customs clearance procedures). If the importing country does not make a report or reports a zero, we replace it when possible using positive reports made by the exporter.[2] When using exporter reported trade, we adjust for the fact that exports are reported FOB while imports are reported CIF, with a 10% difference in value, which is the actual mean margin revealed by countries reporting imports in both CIF and FOB values.

Figure 2 shows the number of dyads (observations for exporter $i$ and importer $j$) of positive bilateral trade flows in each year according to the timing of independence. We show four categories of colonial relationships: current colonies (solid lines) as well as former colonies after 1–19 years (long dashes), 20–49 years (shorter dashes), and more than 50 years (dots and dashes) of independence. The main point we draw from this figure is that sample sizes appear large enough to estimate the effects of varying numbers of years since independence. The bump up in trade dyads for current colonies arises because of increases in data availability in 1958 (France begins to report data on its dependencies) and 1960 (newly independent French colonies begin to report). The 1961 jump in dyads that have been independent 1–19 years is followed two decades later by a jump in the number of dyads with 20–49 years, as the African former French colonies "progress" through intervals of independence.

The data base we compiled is larger than most comparable work using DOTS. Our typical regression includes around 620,000 observations. Glick and Rose's (2002) study of currency unions uses DOTS but has about 220,000 observations in part because their study ends in 1997 and their main specification averages bilateral exports and imports. Baier and Bergstrand (2007) also use DOTS (without averaging) but only at 5 years intervals (9 different years starting in 1960), which reduces their sample to 47,081 observations. As emphasized by Baldwin (2006), considering the direction of trade is important

[2]Although the DOTS contains both zeros and missing data, inspection of the data shows many examples with zero reports that should be positive.

to maintain a connection to the underlying theory. It is important for us to have annual data to be able to estimate the extent that trade changes in the first years after independence.

# 3 Specification

In order to estimate the effects of independence, we need a benchmark for the amount of trade expected had independence not occurred. We will follow the common practice of modeling "expected" bilateral trade using a specification based on the gravity equation.

All the well-known empirical and theoretical formulations of the gravity equation can be represented in the following equation for the value of $x_{ij}$, the exports from supplying country $i$ to importing country $j$:[3]

$$x_{ij} = GS_iM_j\phi_{ij}. \tag{1}$$

In this equation, $S_i$ and $M_j$ are indexes of the attributes of supplier $i$ and importer $j$, and $G$ is a factor that does not vary across countries (but can vary across time periods). Variation in bilateral trade intensity enters through $\phi_{ij}$. We refer to $S_i$ and $M_j$ as monadic effects and $\phi_{ij}$ as the dyadic effect.

The general approach to estimation is to take logs to obtain an equation that is linear in the parameters.

$$\ln x_{ij} = \ln G + \ln S_i + \ln M_j - \ln \phi_{ij}. \tag{2}$$

Then the researcher chooses proxies for the monadic and dyadic effects and inserts an error term to represent remaining variation in trade. The next two subsections explain how we model the monadic ($\ln S_i$ and $\ln M_j$) and dyadic effects ($\ln \phi_{ij}$).

[3]See Anderson and van Wincoop (2003), Eaton and Kortum (2002), and Chaney (2008).

## 3.1 Monadic issues

In many empirical applications, which we will refer to as the "simple gravity" approach, the exporter and importer attributes are assumed to be given by $S_i = N_i^{\alpha_1} y_i^{\alpha_2}$ and $M_j = N_j^{\alpha_3} y_j^{\alpha_4}$, where $N$ represents population and $y$ is GDP per capita.[4] Plugging in these monadic effects we re-express equation (2) as

$$\ln x_{ij} = \ln G + \alpha_1 \ln N_i + \alpha_2 \ln y_i + \alpha_3 \ln N_j + \alpha_4 \ln y_j - \ln \phi_{ij}. \tag{3}$$

Theoretical derivations of the gravity equation imply that the monadic factors also depend on non-linear functions of the dyadic part of (1). This occurs for two main reasons. In the Anderson and van Wincoop (2003) derivation, for instance, the basic reason why $M_j$ depends on the whole set of dyadic variables and parameters is that the consumer's allocation of income depends on relative prices. The reason why the exporter's monadic effect $S_i$ depends on the dyadic vector is the market-clearing requirement. This condition says that total sales in all markets from exporter $i$ should equal the supplier's aggregate output. Anderson and van Wincoop call the terms involving the whole vectors of dyadic $\phi_{ij}$ "multilateral resistance indices." Their omission in equation (3) has the potential to bias estimates.

The solution proposed in Anderson and van Wincoop (2003) requires that a structural model be used to specify the monadic effects as a function of GDPs and the dyadic vector. There are three problems. First, the results may depend on the structure. While there are multiple micro-foundations for equation (1), they differ in terms of the underlying monadic terms. Second, the monadic terms depend upon the whole dyadic vector including the "internal" distances of countries. Applications suggest that results are not robust to alternate ways of calculating "internal" distances. Third, the method presents

[4] Alternatively, one can substitute GDP for population which will result in different coefficient estimates but with identical fit.

computational difficulties.

An alternative estimates the monadic effects $\ln S_i$ and $\ln M_j$ in equation (2) using fixed effects for $i$ and $j$. With a balanced panel of bilateral exports, a *within* transformation can be used for removing the monadic effects. Due to missing data, zeros, and variation in the number of partner trade for each reporting country, actual bilateral data sets are almost never balanced. Baltagi (1995, p. 160) points out that the within transformation does not work with unbalanced two-way panels. One should therefore use the least squares dummy variable (LSDV) method. Since DoTS has close to 200 trade entities and over 50 years of trade, the LSDV approach involves about 20,000 dummies. This presents computational difficulties of a different kind: programming is trivial but the execution requires a massive matrix inversion.

Baier and Bergstrand (2006) offer a third approach they call *bonus vetus* OLS. It is based on a linear approximation around a centering point and is implemented via demeaning transformations of the dyadic variables. Their approach assumes that all determinants of trade costs are observed so that they can be incorporated into the approximation. Unobserved multilateral and bilateral trade costs that are correlated with colonial separations would bias the estimates of independence effects.

We apply a different approach to estimation. It takes advantage of the multiplicative structure of equation (1) and then takes the ratio of ratios to eliminate the monadic effects (including the multilateral resistance terms). This requires a set of *four* trading partners. For that reason, we call it the method of *tetrads*.

Consider four countries indexed $i$, $j$, $k$, and $\ell$. Using (1), the ratio of $i$'s exports to $j$ over its exports to importer $k$ is given by

$$R_{i\{jk\}} = \frac{x_{ij}}{x_{ik}} = \frac{M_j \phi_{ij}}{M_k \phi_{ik}}. \tag{4}$$

We have canceled out $G$, and more importantly, $S_i$, the exporter fixed effect. The $M_j/M_k$

ratio remains problematic for estimation however, and we now need an expression parallel to (4) containing $M_j/M_k$ that we can divide $R_{i\{jk\}}$ by in order to cancel out these remaining monadic terms. This can be achieved by picking a reference exporter $\ell$ and calculating the corresponding ratio to the same pair of importers:

$$R_{\ell\{jk\}} = \frac{x_{\ell j}}{x_{\ell k}} = \frac{M_j \phi_{\ell j}}{M_k \phi_{\ell k}}. \tag{5}$$

Taking the ratio of ratios we can define the tetradic term

$$r_{\{i\ell\}\{jk\}} = \frac{R_{i\{jk\}}}{R_{\ell\{jk\}}} = \frac{x_{ij}/x_{ik}}{x_{\ell j}/x_{\ell k}} = \frac{\phi_{ij}/\phi_{ik}}{\phi_{\ell j}/\phi_{\ell k}}, \tag{6}$$

where the tetrad comprises two exporters, $\{i\ell\}$, and two importers, $\{jk\}$. Taking logs, we have

$$\ln r_{\{i\ell\}\{jk\}} = \ln \phi_{ij} - \ln \phi_{ik} - \ln \phi_{\ell j} + \ln \phi_{\ell k}. \tag{7}$$

We now specify $\phi_{ij}$ to show how the $r_{\{i\ell\}\{jk\}}$ can be used to estimate the parameters determining bilateral trade intensity. The log dyadic effect is given by

$$\ln \phi_{ij} = \beta B_{ij} + u_{ij} \tag{8}$$

The $B_{ij}$ and $u_{ij}$ in this equation represent respectively observed and unobserved bilateral linkages. Plugging this expression back into equation (7), we have

$$\ln r_{\{i\ell\}\{jk\}} = \beta(B_{ij} - B_{ik} - B_{\ell j} + B_{\ell k}) + u_{ij} - u_{ik} - u_{\ell j} + u_{\ell k}. \tag{9}$$

For binary linkage variables, the sum above can take on five possible values: 2, 1, 0, $-1$ and $-2$, depending on the pattern of linkages within the tetrad.

Our approach can be seen as an extension of existing ratio approaches that take

advantage of the multiplicative functional form of the gravity equation to get rid of *either* the exporters' (Anderson and Marcouiller, 2002) or importers' (Head and Mayer, 2000, and Martin et al., 2008) fixed effects. Combining the two approaches yields a specification *free of any monadic term.*[5] Two recent papers also employ the ratio of ratios to eliminate the monadic terms. Romalis (2007) estimates the response of US imports from Canada and Mexico to NAFTA tariff reductions. Hallak (2006) uses the approach to quantify the economic magnitude of coefficients obtained from fixed effects gravity equations.

The method presents two special issues. First, one needs to select the reference countries $k$ and $\ell$ in order to do the tetrad calculations.[6] In their single-ratio methods, Anderson and Marcouiller (2002) and Martin et al. (2008) take the United States as the reference country. The EU is the reference importer and the rest of the world is the reference exporter in Romalis (2007). We employ three pairs of reference countries to examine robustness. First, we take the two big colonizers over our sample, France and the United Kingdom. We then use two of the biggest exporters, Germany and the US. Finally, we consider two economies that did not have colonial relationships during our sample, Canada and Switzerland.

A second issue concerns the independence of the observations. As represented in (9), the error terms $u_{\ell k}$, $u_{ik}$, and $u_{\ell j}$, appear repeatedly across observations. Indeed, $u_{\ell k}$ is contained in each observation. We will use year dummies to account for $u_{\ell k}$ but are still left with correlated errors as a consequence of $u_{ik}$, and $u_{\ell j}$. The appropriate form of clustering is more complex than usual here, since the repeated presences of $u_{ik}$ and $u_{\ell j}$ call for both exporter-year and importer-year clusters, which are non-nested. We therefore use multi-way clustering of the kind described in Cameron et al. (2006). We implement their estimation method using three-way clustering: $it$, $jt$, and $ij$.[7]

[5]The computational benefits of the tetrads approach would be even greater for commodity level trade since monadic terms are presumed to be good-specific.

[6]Generating all possible tetrad combinations would involve dealing with literally billions of observations in our case.

[7]Stata programs are available at `http://strategy.sauder.ubc.ca/head/sup/`.

## 3.2 Dyadic issues

Another concern in this study is that the vector of linkage variables, $B_{ij}$, is necessarily incomplete. This means unobserved dyadic $(ij)$ linkages will contaminate the error term. That is, even if we control for importer and exporter effects there are unobserved bilateral influences on both trade and the decision to become independent. With panel data, one can remove the unobserved but fixed component of bilateral linkages using dyadic (country-pair) fixed effects. This identifies the effect of independence based on time series variation. We will therefore also use this type of specification, and follow Baier and Bergstrand (2007) and Glick and Rose (2002) who underscore the importance of capturing policy changes using time-series rather than cross-sectional variation.

Finally we need to specify the set of observable linkages between country pairs in our sample. Using abbreviations, we specify the linkages vector in year $t$ as

$$\mathbf{B}_{ijt} = \{\ln D_{ij}, \text{Lang}_{ij}, \text{Legal}_{ij}, \text{Colony}_{ij}, \text{RTA}_{ijt}, \text{GATT}_{ijt}, \text{CU}_{ijt}, \text{Indep}_{ijt}\}$$

which controls for distance, common language, having common legal origins in national law, the existence of a historical colonial relationship, belonging to a common regional trade arrangement, both countries belonging to GATT/WTO, belonging to a currency union, and independence. Of these, distance, common language, shared legal origins, and colonial history do not vary over time and drop out in specifications with dyadic fixed effects. We also employ year indicator variables to capture changes in average trade propensities over time.

To measure the effect of independence, we employ seven indicator variables corresponding to years subsequent to independence: 1–2, 3–6, 7–11, 12–19, 20–29, 30–49 and 50 or more years. The advantage of this semi-parametric specification is its flexible treatment of how trade evolves subsequent to independence. For example, if networks

underlie the reason why countries with colonial ties trade more with each other, we would expect a gradual decline in these networks over time once independence is achieved. The specification can capture a short-run disruption in trade followed by long-run return to pre-independence levels. It also allows for permanent reductions that are achieved immediately following independence. The omitted category for the independence indicators is the year of independence and previous years.[8]

# 4 Results

Before proceeding to the regression analysis, it is instructive to examine two cases. Figure 3 shows Ivorian ($I$) and Ghanaian ($G$) trade patterns with France ($F$) and the United Kingdom ($U$). The figure reports the ratio of the two countries' trade flows to and from France divided by the corresponding flow with the UK ($x_{IF}/x_{IU}$, $x_{FI}/x_{UI}$, and $x_{GF}/x_{GU}$, $x_{FG}/x_{UG}$). The Ivory Coast was a colony of France until 1960 and Ghana a colony of the UK until 1957. Ghana and the Ivory Coast make a useful case study since they are adjacent, comparable in size, and yet were colonized by different countries. Differences in distances between colonies and metropoles seem negligible. Furthermore, changes in multilateral resistance indices should be fairly similar.[9] If colonial ties did not influence trade, we would expect that the ratio of exports to France to exports to the UK (shown with x-marked lines) to be approximately equal to the relative size of their markets. Similarly, relative imports from the two sources (solid lines) would be equal to their relative production. Using GDP as the measure of relative market and production size, we would expect all four trade lines to be close to the France-to-UK GDP ratio (black dashed line). Instead, we see large gaps on both sides.

France's former colony Ivory Coast trades much more with its former metropole than

[8]There are only 1474 positive trade values for colonial trade prior to independence.

[9]A surge in Nigerian GDP would have approximately the same effect on Ghana and Ivory Coast, whereas a surge in German GDP would have similar effects on the UK and France.

France's relative size would imply. The ratio of export ratios to GDP ratios is 79.3 in the year it became independent. By 2006, the ratio had fallen to 5.9. Its imports also begin heavily biased towards France (ratio of 38.6) and, while the import bias also declines, it persists at 11.7 in 2006. On the other hand, Ghanaian trade exhibits bias towards the UK. The ratios of relative trade to relative GDP are 13.4 (exports) and 23.1 (imports) in 1957. Their decline in recent years has been remarkable and the bias has fallen to 1.9 (exports) and 1.3 (imports) in 2006. Even these numbers should be seen as impressive: Forty-six years after independence Ghana still exports about 90% more to its former ruler than a simple gravity model would predict. From our gravity estimates below, this is larger than if Ghana and the UK belonged to a regional trade agreement, or a currency union.[10]

Another interesting illustration can be made using two comparable countries, where one gained independence, while the other remained part of national territory of the colonial power. The two islands of Reunion and Mauritius are particularly good examples, featured in Figure 4, which uses the same graphical devices as Figure 3. The two islands are only 250 kms away, and were both under the control of France from the early 18th century until the United Kingdom took both islands over in 1810. An interesting accident of history (for our purpose) is that the Congress of Vienna in 1815 gave Reunion island back to France (which it still is), while Mauritius island remained a British colony (until the peaceful 1968 independence). The difference in the trade patterns of the two islands is quite striking. For Reunion, both relative exports and imports seem to fluctuate around an equilibrium stable level of 50, comparable to the level of Ivory Coast at the time of independence in Figure 3, but around 50 times higher than the expected level. By contrast, Mauritius has a very different trade pattern—independence marks a sharp change in the ratio of relative exports to France and UK. While the "metropole premia"

[10]Column (3) of Table 1 states that the effect of signing either type of agreement is to create roughly $\exp(0.5) - 1 = 65\%$ more trade.

Figure 3: Trade of Ivory Coast and Ghana with their respective metropoles

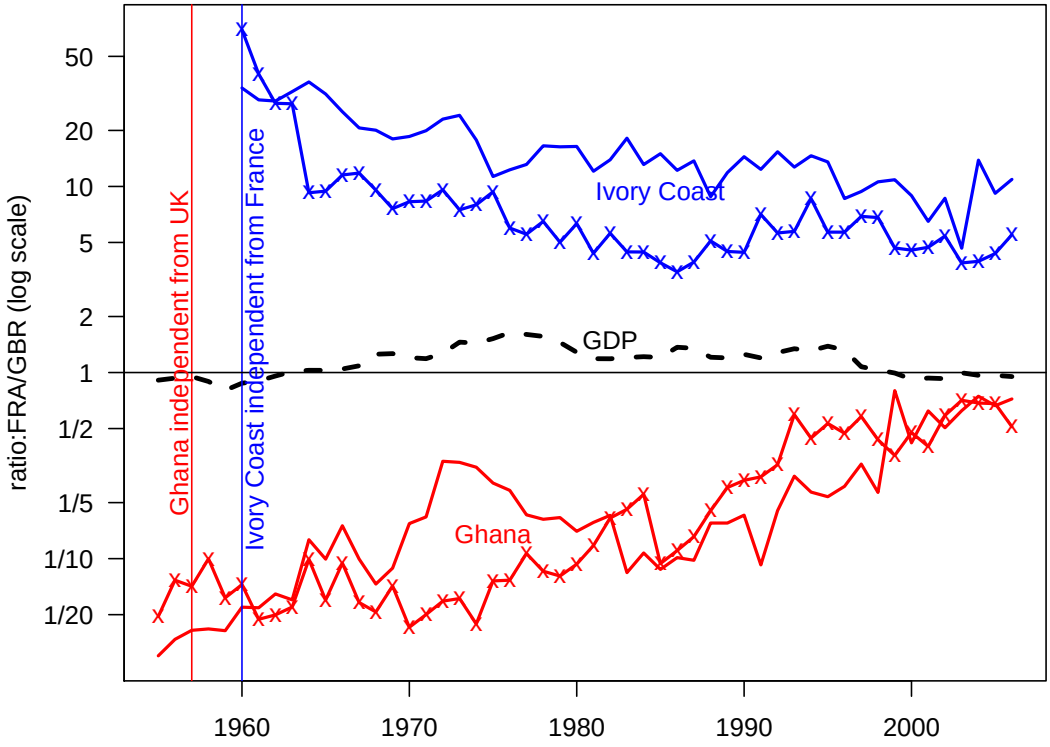
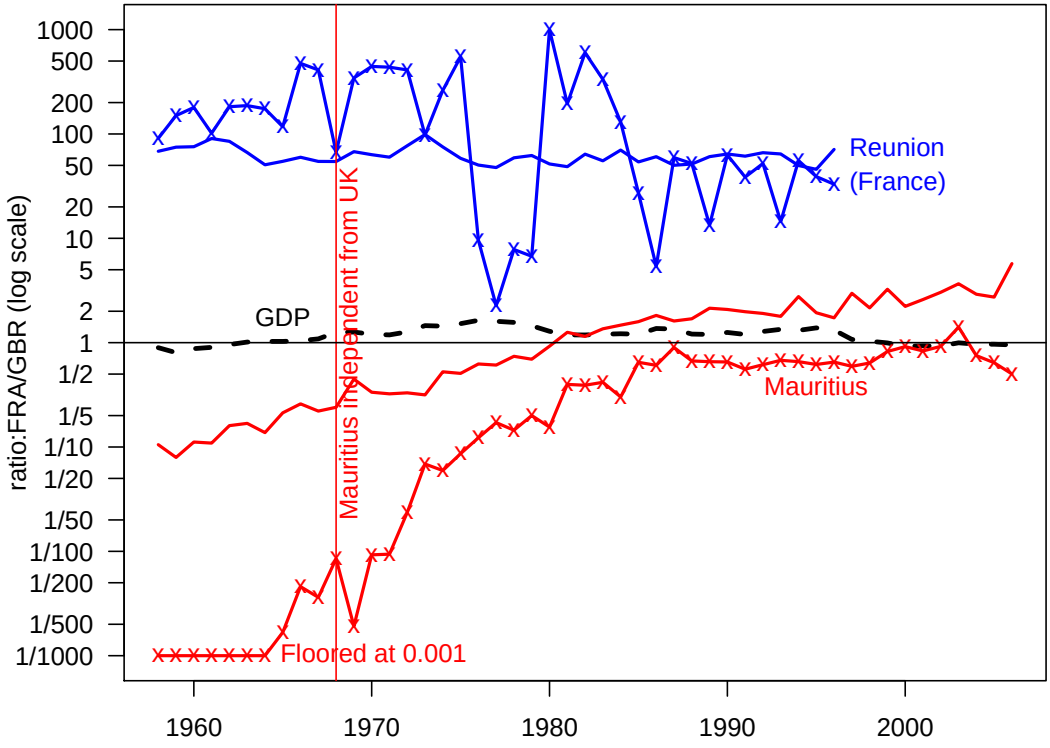



Figure 4: Trade of Reunion and Mauritius islands with their respective metropoles



was close to a factor of 200 in 1968, it falls gradually over time, so that Mauritian exports to UK and France in the 2000s are roughly the same, as expected. Figures 3 and 4 both portray an erosion of colonial trade subsequent to independence. To see if this picture extends generally, we turn to the regression results.

Tables 1 and 2 contain estimation results. We report results for six specifications and present estimates of the control variables in the first table and the independence variables in the second table. The first three columns portray results where exporter and importer population and per capita GDP proxy for exporter-specific and importer-specific effects. In the ensuing three columns, these effects are eliminated by creating tetradic trade flows. This requires choosing reference countries. To investigate the robustness of the method, we employ three country pairs—Great Britain-France, the United States-Germany, and Switzerland-Canada—as the reference countries (designated $k$ and $\ell$ in the previous section) and report estimates for all three. All specifications include year dummies that are not reported in the table.

The first specification pools data, allowing us to compare results for our large panel to those in the literature. The results, listed in column (1), show that increases in exporter- and importer-country per capita income and population promote bilateral trade with elasticities close to one (as predicted in most theoretical derivations). Distance between partners reduces trade and the estimated elasticity is very close to one (the typical finding). The linkages variables—colonial history, common language, GATT membership, RTAs, and currency union—increase trade and all estimates are highly statistically significant. This specification recognizes the possibility of correlated observations within dyads by clustering the standard errors according to $ij$ directional pairs.

Interestingly, the pooled OLS coefficients for RTA and GATT are higher than in published studies. Rose (2004) tends to find negative and insignificant GATT effects in his study of 178 countries over the 1948–1998 period when dyadic effects are excluded.

Table 1: Gravity regression control variables

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| ln Pop, $i$ | $0.978^a$ | $0.893^a$ | $0.290^a$ | | | |
| | (0.006) | (0.009) | (0.046) | | | |
| ln Pop, $j$ | $0.837^a$ | $0.835^a$ | $0.962^a$ | | | |
| | (0.006) | (0.008) | (0.040) | | | |
| ln GDP/Pop, $i$ | $1.118^a$ | $0.921^a$ | $0.732^a$ | | | |
| | (0.007) | (0.010) | (0.015) | | | |
| ln GDP/Pop, $j$ | $0.945^a$ | $0.702^a$ | $0.634^a$ | | | |
| | (0.007) | (0.010) | (0.015) | | | |
| ln Dist (avg) | $-1.035^a$ | $-1.197^a$ | | | | |
| | (0.014) | (0.015) | | | | |
| Shared Language | $0.506^a$ | $0.522^a$ | | | | |
| | (0.034) | (0.038) | | | | |
| Shared Legal Origins | $0.313^a$ | $0.160^a$ | | | | |
| | (0.026) | (0.029) | | | | |
| Colonial History | $1.560^a$ | $2.605^a$ | | | | |
| | (0.380) | (0.206) | | | | |
| RTA | $0.958^a$ | $0.593^a$ | $0.521^a$ | $0.400^a$ | $0.411^a$ | $0.317^a$ |
| | (0.044) | (0.026) | (0.027) | (0.029) | (0.034) | (0.033) |
| Both GATT | $0.125^a$ | $0.155^a$ | $0.159^a$ | $0.244^a$ | $0.368^a$ | $0.206^a$ |
| | (0.020) | (0.016) | (0.017) | (0.038) | (0.041) | (0.042) |
| Currency union | $0.688^a$ | $0.483^a$ | $0.486^a$ | $0.499^a$ | $0.469^a$ | $0.309^a$ |
| | (0.091) | (0.064) | (0.068) | (0.047) | (0.056) | (0.089) |
| Tetrads: | | | | GBR,FRA | USA,DEU | CHE,CAN |
| Fixed Effects: | None | Dyads(RE) | Dyads | Tetrads | Tetrads | Tetrads |
| # Obs. | 618233 | 618233 | 618233 | 665531 | 651603 | 633190 |
| RMSE | 2.165 | 1.480 | 1.473 | 1.677 | 1.722 | 1.832 |

Note: Standard errors in parentheses with $^a$, $^b$ and $^c$ respectively denoting significance at the 1%, 5% and 10% levels. Standard errors are corrected to take into account correlation of errors within dyads in columns (1) to (3). Columns (4) to (6) use three-way clustering by dyad, $i$-year, and $j$-year using Cameron et al. (2006) method.

The number of observations in his study, 234,597 in the baseline regression, is less than half the 618,233 observations in our analysis. Likewise, Baier and Bergstrand (2007, Table 4, column 2) obtain RTA coefficients of 0.27 for pooled OLS, considerably smaller than our 0.96 estimate. They use 1960, 1970, 1980, 1990, 2000 data and 96 countries and thus only have 47,081 observations.

Column (2) takes into account unobserved persistent dyadic influences using random effects. Random effects is a GLS transformation of the data in which each variable $z_{ijt}$ is replaced by $z_{ijt} - \hat{\theta}_{ij}\bar{z}_{ij}$. Thus the variables are being quasi-differenced by the dyadic means. If $\hat{\theta}_{ij} = 1$, then this specification would be the fixed effects within transformation. Instead, random effects estimates $\hat{\theta}_{ij}$ based on the number of observations per dyad and the relative variances of the between and within dimensions of the data. In these estimations the median $\hat{\theta}_{ij}$ is 0.8, which helps to explain why the results look very similar to those shown in column (3) for fixed effects. Given this similarity, we will not comment on them except for the estimate for colonial history. That variable has no within-dyad variation (it is coded so as to equal one if ever the country pair were in a colonial relationship). To assess the influence of a colonial relationship after a certain number of years, one should subtract the relevant independence coefficient from the estimate of colonial history obtained in this specification, 2.6. This coefficient implies that countries in ongoing colonial relationships have, on average, 13.5 ($= e^{2.6}$) times more trade than other country pairs.

Column (3) introduces dyadic fixed effects and thus estimates are based on time-series variation within dyads. Linkage variables that do not vary over time (distance, shared language, colonial history, and shared legal origins) are captured by the dyadic fixed effects. In comparison to the column (1) pooled OLS estimates, the coefficients fall but remain statistically significant. The GATT effect of 0.16 is almost the same as the 0.15 estimate that Rose obtains when he employs dyadic fixed effects. The RTA estimate of

0.52 is relatively close to Baier and Bergstrand's comparable estimate of 0.68.[11] The effect of currency unions, 0.49, is somewhat lower than the 0.65 found in Glick and Rose (2002) using the same method.

In the final three specifications, the tetrad method removes all (time-varying) monadic effects (e.g., population, per capita income, and multilateral resistance terms). We also employ tetradic fixed effects which eliminate non-time varying bilateral linkage variables. Looking across columns (4)–(6), regressions that use Great Britain-France, the United States-Germany, and Switzerland-Canada as reference countries, we find that the signs of estimated coefficients on RTA, GATT, and currency union are the same as those listed in column (3) but the magnitudes vary somewhat. The RTA estimates are smaller than those shown in column (3) whereas the estimates of GATT membership are slightly larger. The estimates for currency union are quite similar to those estimated by random or fixed effects, but lower than OLS estimates.

Table 2 lists estimates of the seven independence variables corresponding to trade at increased intervals since liberation: 1–2 years, 3–6 years, 7–11 years, 12–19 years, 20–29 years, 30–49 years, and 50+ years. Column (1) exhibits the pooled OLS results. For the newly independent (the first ten years), independence is associated with *higher* trade although the effects are only marginally significant. Evidently, trade between colony and colonizer shortly after independence was higher than colonial trade for existing colonies and colonies that were independent for longer periods of time. Of course, it may be the case that these newly independent countries' trade with their colonizer was higher than average *before* independence as well. For this reason, we prefer the estimates in the ensuing columns that emphasize within-dyad variation over time. The dyadic and tetradic fixed effects regressions purge observations of average country-pair trade and estimates are based on time-series changes in trade. Given the high values of $\hat{\theta}_{ij}$, random effects largely removes mean dyad effects.

[11] Their estimate falls to 0.46 when monadic fixed effects are introduced.

Table 2: Independence effects on bilateral trade flows

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| 1–2 Years | 0.607 | 0.106 | 0.114 | 0.080 | -0.129 | -0.359$^{c}$ |
| | (0.379) | (0.183) | (0.191) | (0.085) | (0.186) | (0.194) |
| 3–6 Years | 0.611 | 0.082 | 0.082 | 0.126$^{c}$ | -0.307$^{c}$ | -0.200 |
| | (0.382) | (0.192) | (0.201) | (0.076) | (0.164) | (0.217) |
| 7–11 Years | 0.629$^{c}$ | 0.066 | 0.047 | 0.137$^{c}$ | -0.453$^{a}$ | -0.216 |
| | (0.381) | (0.197) | (0.205) | (0.076) | (0.157) | (0.219) |
| 12–19 Years | 0.318 | -0.239 | -0.255 | -0.017 | -0.705$^{a}$ | -0.195 |
| | (0.382) | (0.204) | (0.213) | (0.077) | (0.165) | (0.212) |
| 20–29 Years | 0.058 | -0.536$^{a}$ | -0.565$^{a}$ | -0.249$^{a}$ | -0.929$^{a}$ | -0.324 |
| | (0.382) | (0.203) | (0.211) | (0.079) | (0.174) | (0.217) |
| 30–49 Years | -0.464 | -0.919$^{a}$ | -0.946$^{a}$ | -0.544$^{a}$ | -1.467$^{a}$ | -0.799$^{a}$ |
| | (0.388) | (0.203) | (0.213) | (0.081) | (0.174) | (0.227) |
| 50+ Years | -1.157$^{a}$ | -0.808$^{a}$ | -0.756$^{a}$ | -0.663$^{a}$ | -1.320$^{a}$ | -0.764$^{a}$ |
| | (0.389) | (0.233) | (0.254) | (0.106) | (0.216) | (0.282) |
| Tetrads: | | | | GBR,FRA | USA,DEU | CHE,CAN |
| Fixed Effects: | None | Dyads(RE) | Dyads | Tetrads | Tetrads | Tetrads |
| # Obs. | 618233 | 618233 | 618233 | 665531 | 651603 | 633190 |
| RMSE | 2.165 | 1.480 | 1.473 | 1.677 | 1.722 | 1.832 |

Note: Standard errors in parentheses with $^{a}$, $^{b}$ and $^{c}$ respectively denoting significance at the 1%, 5% and 10% levels. Standard errors are corrected to take into account correlation of errors within dyads in columns (1) and (2). Columns (3) to (5) use three-way clustering by dyad, $i$-year, and $j$-year using Cameron et al. (2006) method. All columns report coefficients from the same regressions as the ones with identical numbering in Table 1.

Columns (2) and (3) reveal that, with dyadic random or fixed effects, independence is estimated to have small and insignificant positive effects on trade in the first decade. Then it turns negative, becoming significantly negative in the 20–29 year interval. Trade with the metropole is minimized in the 30–49 year interval.[12] Using the column (3) estimate, independence for 30–49 years contracts bilateral trade to 39% ($e^{-0.946}$) of its independence-year level. The small rebound in bilateral trade estimated for 50 or more years does not arise in all specifications and is not statistically significant in any specification (except OLS).

Given the finite span of our trade data, we do not observe all bilateral relationships passing through each interval since independence. Thus, since the Soviet Union collapsed in 1991, post-USSR trade flows contribute to the estimates of the first four intervals, but not the later ones. However, unreported regressions on the first three columns of Tables 1 and 2 show very little difference in the coefficients estimated when we omit former Soviet Republics from the regressions.[13]

The random effects specification reported in column (2) allows us to compare trade of countries that have been independent for very long periods with those that remain colonies to this day.[14] The effect of being in a colonial relationship is estimated to be 2.605, whereas 50 years of independence has a coefficient of −0.808. Thus, even in the long-run, countries that once had a colonial relationship trade *six times* ($e^{2.6-0.8}$) more than other dyads. If one includes the effects of a common language and legal system, which many former colonies retained centuries after independence, the total long-run impact of colonization on trade rises to a factor of 12 ($= e^{2.6+0.5+0.2-0.8}$).

[12] We also estimated a specification with the first four intervals given by 1–4, 5–9, 10–14, and 15–19. The column (3) results become 0.125, 0.138$^c$, −0.095, −0.284$^a$, −0.527$^a$, −0.908$^a$, and −0.716$^a$. Thus we still see small positive effects in the first decade, followed by increasingly negative and significant coefficients, with the largest estimated reduction at 30–49 years.

[13] Taking column (3) as an example, the independence coefficients are 0.166, 0.087, 0.054, −0.233, −0.536$^b$, −0.911$^a$, and −0.725$^a$. Therefore 30 to 49 years of independence reduces trade to 40% of its initial level in this sample, against 39% when including the former USSR in the regression.

[14] Fixed effects drops the colony history dummy because it is not time-varying within dyads.

Columns (4)–(6) show the tetrad results and corroborate the findings of large declines in trade after two decades of independence. The point estimates vary somewhat depending on the choice of reference countries, with larger estimates obtained in in column (5) using USA and Germany and smaller estimates found for Switzerland-Canada and Britain-France.

Three alternative explanations for observed reductions in trade with the metropole after independence are (1) reverse causation, (2) the cessation of formal trade preferences, and (3) the deterioration of trade-promoting capital such as common institutions and business networks. Reverse causation arises if metropoles relinquish control of colonies once they have exploited all the trading opportunities (e.g., extracted all the natural resources). Trade reduction, therefore, would have occurred even without independence. In the cases of reverse causation and cessation of preferential trade policies, we would expect trade reductions to occur soon after the country gained sovereignty. In the preferred estimates in the last four columns of Table 2 that employ dyad fixed effects, there is limited evidence of significant trade erosion in the first six years. Trade levels persisting many years after independence are inconsistent with explanations (1) and (2).

We observe that independence reduces colony trade with the metropole. But what happens to colonial trade with other countries in the colonial empire (siblings) as well as rest-of-world (RoW) countries? As is the case with trade with the metropole, trade between siblings may decline suddenly due to trade preference cessation or gradually due to deterioration in colonial networks and institutions. There are a couple of reasons to expect that trade might *increase* with RoW countries. First, rising trading costs with the metropole and siblings could divert trade to other countries. Second, the metropole might have constrained the ability of colonies to trade with RoW countries prior to independence.[15] To measure the impact of years of independence on trade with each type

[15]Bonfatti (2008) develops a Heckscher-Ohlin model of trade between a colony, metropole, and third country that predicts that independence is more likely for colonies with good trading opportunities with the rest of world. An implication of the analysis is that independence should be accompanied by increased

of country, we estimate distinct independence effects for a colony's trade with metropole, siblings, and RoW countries. We deem a sibling relationship to be severed when the first of a pair of siblings gains independence. Years since independence for a sibling dyad is calculated as the current year minus the year of severance. For colony-RoW dyads, years since independence is the current year minus the year that the colony became independent.[16]

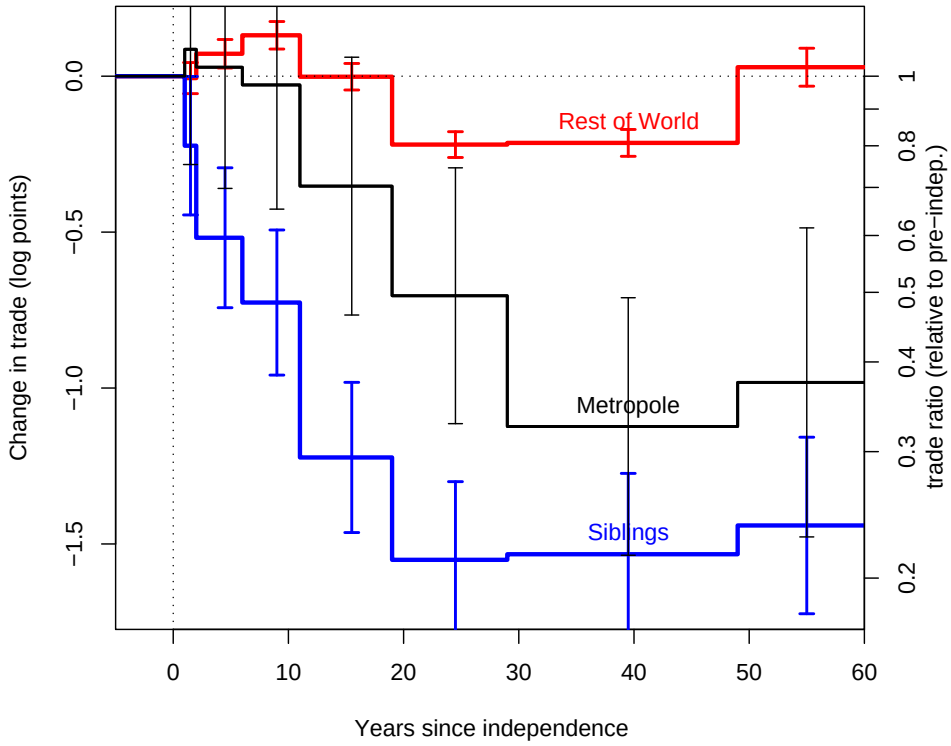



Figure 5: Independence effects on colonial trade with metropole, "siblings," and the rest of the world

Figure 5 portrays the estimates of the 21 independence variables (seven intervals, 3 types of relationship). They are based on the dyadic, fixed-effect specification used in

trade with the third country (RoW).

[16]Some countries were colonized by a succession of metropoles. For example, Papua New Guinea (PNG) became independent from Great Britain in 1901, Germany in 1915, and Australia in 1975. For PNG-RoW dyads, years since independence is the current year minus 1975, the year it was no longer subject to colonial rule.

column (3) of Tables 1 and 2, rather than the tetrad method. The tetrad method eliminates monadic effects, which reflect a country's general trading propensity in a given year. However, it is the changes in a colony's general trading propensity following independence that we intend to capture using the RoW independence variables. The figure shows each of the seven independence intervals as a step function and also shows the 95% confidence interval around the point estimate. The left axis shows the coefficient estimate and the right axis converts the estimate to the ratio of post-independence trade to pre-independence trade.

The coefficients for trade with the metropole are similar to those from Table 2: After about a decade in which trade does not change significantly, a gradual erosion begins that results in a more than 60% reduction in trade after three decades of independence.[17] For siblings we find strong trade erosion as well. In contrast to trade with the metropole, however, statistically significant reductions in trade occur in the first and second year post-independence. The reductions strengthen for two decades before flattening out at almost 80% below the level seen at and before the year of independence. In the case of colony trade with RoW, Figure 5 reveals small, significant increases in trade in the first decade after independence—a 14% increase in the 7–11 years interval—that becomes negative and significant for 20–50 years after independence. In the long run (more than 50 years) RoW trade is not significantly different from the year of independence.

We interpret the gradual trade erosion observed between siblings as evidence that the trade-enhancing "capital" (networks and institutions) associated with empires encouraged inter-sibling trade and that this capital depreciates after independence. The estimates of larger trade contraction for siblings than metropoles is surprising. However, the confidence intervals for metropole and sibling independence estimates overlap with each other 30 years after independence. Contrary to the hypothesis that empires acted

[17]The coefficients for the control variables differ very little from the estimates report in column (3) of Tables 1.

as constraints on pre-independence trade diversification of colonies, we find only modest and transitory increases with RoW countries.

Previous research has shown that immigrants are associated with increased trade with their countries of birth (see Gould (1994) and Head and Ries (1998) for early evidence). The interpretation of this result is that immigrant networks mitigate "informational" barriers to trade. The pattern of independence effects may result from the gradual decline of expatriate populations, leading to the erosion of business networks. We scrutinize this proposition by compiling data on French nationals living abroad.[18] The data covers expatriates in 153 countries over the 1965–2006 period. Substantial numbers of French nationals resided in France's colonies. For instance, in 1965, there were about 137,000, 90,000, and 60,000 expatriates in Morocco, Algeria and Madagascar, respectively.

To investigate the hypothesis that declining networks underlie the observed trade erosion, we first examine how expatriate populations in the French Empire change subsequent to independence and then add expatriate populations as an additional covariate in bilateral trade regressions. The first three columns of Table 3 focus on colony-metropole relations and the second three columns focus on sibling relations. In all specifications, we exclude observations involving RoW countries (those outside the French Empire). Columns (1) and (4) display estimates of the effects of independence on expatriate populations. The other columns use bilateral trade as the dependent variable. All specifications include fixed effects for dyads and years and the control variables reported in column (3) of Table 1.

Column (1), where the dependent variable is specified as the log of the expat population, reveals that the number of French living in colonies falls steadily after independence. French expat data is only available after independence so here the reference period is the population of expats 1–2 years after independence. The effects cumulate

[18]We are very grateful to Bernard Gentil for making this data from the French Ministry of Foreign Affairs available to us and helping us with the extraction and understanding of this data.

Table 3: French expatriates and trade within the French Empire

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Sample: | Colony-Metropole | | | Siblings | | |
| Depvar: | Expats | Trade | Trade | Expats | Trade | Trade |
| 3–6 Years | -0.484$^{c}$ | -0.462$^{c}$ | -0.324 | | | |
| | (0.263) | (0.254) | (0.272) | | | |
| 7–11 Years | -0.570$^{b}$ | -0.502$^{b}$ | -0.341 | -0.022 | -0.021 | -0.064 |
| | (0.253) | (0.239) | (0.254) | (0.065) | (0.184) | (0.183) |
| 12–19 Years | -0.713$^{b}$ | -0.923$^{a}$ | -0.718$^{b}$ | -0.175$^{b}$ | -0.845$^{a}$ | -0.871$^{a}$ |
| | (0.285) | (0.291) | (0.315) | (0.084) | (0.278) | (0.276) |
| 20–29 Years | -1.317$^{a}$ | -1.263$^{a}$ | -0.885$^{a}$ | -0.830$^{a}$ | -1.232$^{a}$ | -1.169$^{a}$ |
| | (0.371) | (0.323) | (0.343) | (0.115) | (0.317) | (0.319) |
| 30–49 Years | -2.058$^{a}$ | -1.787$^{a}$ | -1.198$^{a}$ | -1.618$^{a}$ | -1.399$^{a}$ | -1.219$^{a}$ |
| | (0.518) | (0.399) | (0.401) | (0.137) | (0.365) | (0.373) |
| 50+ Years | -1.785$^{a}$ | -1.698$^{a}$ | -1.190$^{b}$ | -1.333$^{a}$ | -1.109$^{a}$ | -0.995$^{b}$ |
| | (0.576) | (0.453) | (0.464) | (0.158) | (0.40) | (0.405) |
| Expats | | | 0.290$^{a}$ | | | 0.206$^{a}$ |
| | | | (0.077) | | | (0.072) |
| N | 1153 | 2299 | 2299 | 13319 | 15549 | 15549 |
| $R^2$ | 0.354 | 0.592 | 0.605 | 0.395 | 0.181 | 0.184 |
| RMSE | 0.414 | 0.651 | 0.640 | .538 | 1.642 | 1.639 |

Note: Expats measured as the log of expat population in the colony in columns (1) and (3) and the sum of the log expat populations in columns (4) and (6). Standard errors in parentheses with $^{a}$, $^{b}$ and $^{c}$ respectively denoting significance at the 1%, 5% and 10% levels. All specifications include the full set of controls, dyad fixed effects, and dyad-clustered standard errors.

over time, bottoming out 30–49 years after independence, when expat populations are 13% ($= \exp(-2.058)$) of their average level in the reference period.

Trade between France and its colonies exhibits independence effects that are very similar in magnitude and timing to the declines seen for expats. As shown in column (2) of Table 3, the reduction in trade is strongest after three decades, with the former colony trading just 17% of the level in the reference period. This trade erosion is larger than the amount estimated for the full sample (shown in Figure 5), where the estimated coefficients imply that three decades after independence trade has eroded to 30% of the level 1–2 years after independence. Column (3) reveals that declining expat populations account

for some of the decline in trade after independence. The coefficient on the log of the expat population is significant and equal to 0.290, implying a 10% reduction in expats leads to about a 3% reduction in bilateral trade. This estimate lies within the range obtained in the immigration and trade literature.[19] The coefficients on the independence intervals fall in column (3) relative to column (2). After accounting for the effect of declines in expats, the reduction in trade due to 30 years of independence falls from 83% to 70%.

The relationships between expats, trade, and independence extend to siblings. Each observation used in the specifications in the last three columns of the table consists of a pair of French colonies. Here we are interested in how French expatriates affect trade between the countries in which they reside.[20] To take into account expat populations in both siblings, we redefine the expat variable as the sum of the logs of each sibling's population of French nationals.[21] Column (4) shows that the redefined variable falls steadily after independence. Recall that we designate the year the first colony leaves the empire as the independence date for the sibling pair. Unlike the colony-metropole regressions in the previous three columns, we do not observe any transitions from 1–2 years of independence to 3–6 years of independence, and thus our reference group in now the period 3–6 years after independence. Columns (5) and (6) reveal that declines in expat populations explain some of the trade erosion between siblings. In column (6), the coefficient on log expats is 0.206, one-third smaller than the coefficient in column (3). As a consequence, expat populations account for a smaller amount of trade erosion. The reduction in trade between siblings due to 30 years of independence (relative to the 3–6 year reference group) falls from 67% to 63%.

The gradual decline in trade cumulating over three decades, may be a result of a similar declines in business networks, for which expat populations may constitute an important

[19] See Table 1 of Wagner et al (2002).

[20] This exercise is similar to that of Rauch and Trindade (2002) who find that overseas Chinese populations promote trade, particularly for differentiated products, which they interpret as a network effect.

[21] We also redefine population and per-capita income as the sum of the logs of each sibling pair.

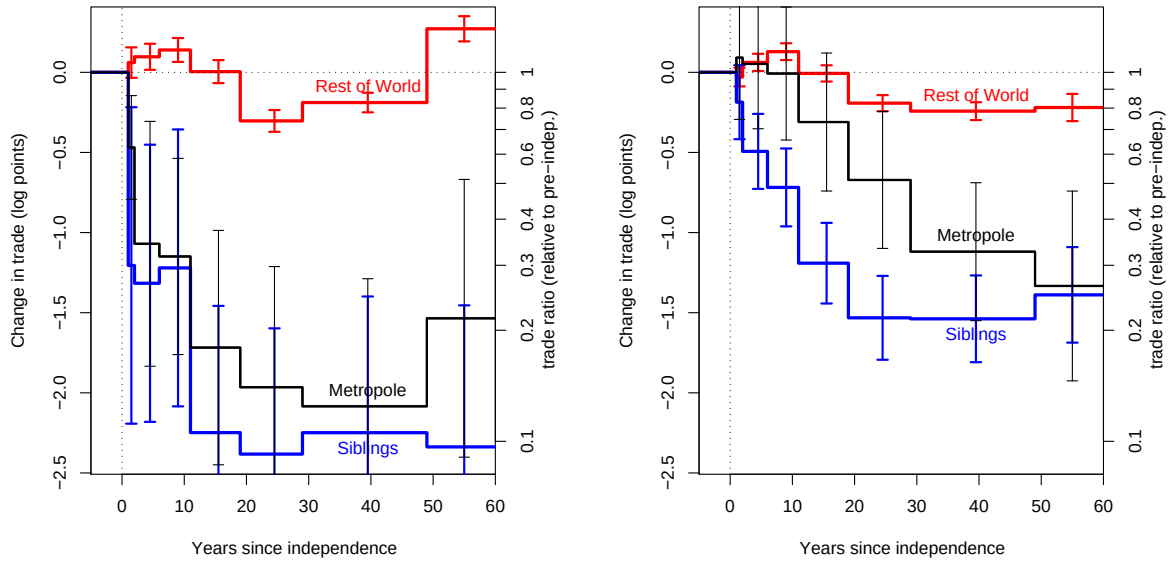
element. Table 3 reveals that trade and expat populations follow correlated patterns of decline in the wake of independence. Explicitly including expats into a trade regression reduces, but does not eliminate, the trade erosion captured by the independence intervals.

The circumstances of the dissolution of colonial ties varied greatly. Some colonies fought wars to obtain their independence whereas others exited from empires with minimal acrimony. For example, Algeria's independence from France in 1962 involved a protracted conflict whereas Senegal's 1960 independence occurred peacefully. We would expect hostile independence events to cause more trade disruption than amicable ones. Indeed, it is possible that amicable separations do not depress trade at all and that the results we have obtained so far are averages of negative consequences of hostile separations and zero effects for amicable ones. We test these propositions by categorizing the independence events as peaceful or hostile. Of the 220 independence events in our data set, we categorized 154 as amicable and 66 as hostile.[22] However, limiting the sample to events that provide times series information in our period of study, those occurring after 1900, we have 131 amicable and 43 hostile separations.

Figure 6 presents estimated independence coefficients for separations involving conflicts in panel (a), whereas panel (b) shows the results for non-hostile separations. The first result to note is that hostile separations lead to larger declines in trade with the metropole than amicable separations. The dynamics differ as well. Hostile separations have larger immediate effects—which are statistically significant just two years after independence. In contrast, it takes more than two decades for amicable separations to lead to statistically significant trade reductions with the metropole. These findings are consistent with our network capital explanation of independence effects. We interpret hostile separations as abruptly destroying social capital between the two countries. In contrast, amicable separations seem to reduce trade via gradual depreciation.

[22]We started with information listed in the "Territorial Change" database (Tir, Schafer, and Diehl, 1998) from the Correlates of Wars project and used internet sources (the CIA Factbook, BBC country briefs, and Wikipedia) to complete the classification, shown in Table 4.

Figure 6: Independence effects depend on type of separation




(a) Hostile separations

(b) Amicable separations

After 50 years of independence, trade relationships between former colony and metropole (the black lines in each panel) appear to converge in the range of 20–30% of pre-independence trade. Thus, the amount of long-run trade erosion does not depend on the way independence was achieved. The blue lines designating sibling trade after independence reveal more long-run trade destruction for hostile separations, but the standard errors of these estimates are large. Examining trade with the rest of world (RoW), we see short-run increases for both types of separation. Hostile separations result in more with RoW countries after 50 years. Amicable separations are associated with a relatively small (20%) but significant reduction in long-run trade with RoW. Thus, in contrast with hostile separations, colonies that exited amicably did not replace lost trade within the empire with additional trade outside it.

# 5 Conclusion

We find that independence reduces colonial trade with the metropole and other countries in the colonial empire. On average, trade between a colony and its metropole and siblings is reduced by more than 60% after 30 years of independence. The trade erosion is even more pronounced in the case of hostile separations. The trade deterioration associated with independence, however, only partially offsets the long-term advantage of having a colonial history with a trading partner.

If the newly established government of an independent country implemented trade-restricting commercial policies, we would expect an immediate and permanent reduction in trade. We do not observe immediate reductions in trade with the metropole. The observed erosion in trade that cumulates over an extended time period subsequent to independence suggests other forces at work. In particular, trade networks embodied in individuals with knowledge of trading opportunities may have deteriorated over time. Our evidence showing that decreases in the number of French living abroad explain a portion of the post-independence trade deterioration supports this view.

The observed erosion in colonial trade can be explained by higher trade costs, arguably due to the deterioration of trade networks. Higher trade costs reduce welfare for the former colony via two channels. First, consumers pay higher prices for imports. Second, producers have less access to markets (referred to as market potential in the economic geography literature). Welfare costs of higher trade costs within the former empire would have been mitigated, if there were easily accessible alternative sources of supply and demand. Our results show little evidence of expanded trade by former colonies with the rest of the world. Thus, the long-run contraction of trade of former colonies suggests deleterious welfare effects of independence. A full accounting of welfare changes would require a structural model as well as consideration of the internal consequences of independence.

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# Appendix: Gravity controls and independence dates

GDPs and populations come from the World Bank's World Development Indicators (WDI). Note that in accordance to trade flows, GDPs are not deflated. Since the WDI excludes Taiwan, we use national data sources. WDI also starts in 1960 and sometimes does not keep track of countries that ceased to exit, or changed definitions. Typically, WDI has Russian GDP starting in 1989. In order to correct both problems, we complement WDI with population estimates provided by Angus Maddison (`http://www.ggdc.net/maddison/Historical_Statistics/horizontal-file_10-2006.xls`). Furthermore, we also use the 1948–1992 GDP estimates collected by Katherine Barbieri and made available by the Correlates of War project (`http://www.correlatesofwar.org/`).

RTAs are constructed from three main sources: Table 3 of Baier and Bergstrand (2007) supplemented with the WTO web site (`http://www.wto.org/english/tratop_e/region_e/summary_e.xls`) and qualitative information contained in Frankel (1997). GATT/WTO membership of different countries over time comes from the WTO web site. The data on currency unions are an updated and extended version of the list provided by Glick and Rose (2002). Data on common legal origins of the two countries are available from Andrei Shleifer at `http://post.economics.harvard.edu/faculty/shleifer/Data/qgov_web.xls`. Bilateral distances and common (official) language come from the CEPII distance database (`http://www.cepii.fr/anglaisgraph/bdd/distances.htm`). We use the population-weighted great circle distance between large cities of the two countries.

Table 4: Metropoles, colonies, and independence events since 1900

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **UK** | | Ghana | 1957 | Cambodia | 1953 | S Africa | 1902† |
| Bermuda | — | Malaysia | 1957 | Syria | 1946† | **Austria** | |
| Falklands | — | Sudan | 1956 | Lebanon | 1943 | Bosnia | 1918† |
| Gibraltar | — | Eritrea | 1952 | **Russia** | | Croatia | 1918† |
| St Helena | — | Israel | 1948 | Armenia | 1991 | Czechia | 1918† |
| Hong Kong | 1997 | Burma | 1948 | Azerbaijan | 1991 | Slovenia | 1918† |
| Brunei | 1984 | Sri Lanka | 1948 | Belarus | 1991 | **Japan** | |
| St Kitts | 1983 | Bangladesh | 1947 | Estonia | 1991 | Korea, N | 1945† |
| Antigua | 1981 | India | 1947 | Georgia | 1991 | Korea, S | 1945† |
| Belize | 1981 | Pakistan | 1947 | Kazakhstan | 1991 | Palau | 1945† |
| Vanuatu | 1980 | Jordan | 1946 | Kyrgyzstan | 1991 | Taiwan | 1945† |
| Zimbabwe | 1980 | Iraq | 1932 | Latvia | 1991 | **Belgium** | |
| Kiribati | 1979 | Egypt | 1922 | Moldova | 1991 | Burundi | 1962 |
| St Vincent | 1979 | Ireland | 1921† | Tajikistan | 1991 | Rwanda | 1962 |
| St. Lucia | 1979 | Afghanistan | 1919† | Turkmenistan | 1991 | Zaire | 1960 |
| Dominica | 1978 | S Africa | 1910 | Ukraine | 1991 | **Denmark** | |
| Solomon Is. | 1978 | N Zealand | 1907 | Uzbekistan | 1991 | Faroe Is | — |
| Tuvalu | 1978 | Australia | 1901 | Lithuania | 1990 | Greenland | — |
| Seychelles | 1976 | Papua | 1901 | Finland | 1917 | Iceland | 1944 |
| Grenada | 1974 | **France** | | **Greece** | | **Italy** | |
| Bahamas | 1973 | F Guiana | — | Cyprus | — | Somalia | 1960 |
| Bahrain | 1971 | F Polynesia | — | Armenia | 1920† | Libya | 1951 |
| Qatar | 1971 | Guadeloupe | — | Lebanon | 1920† | Eritrea | 1941† |
| UAE | 1971 | Martinique | — | Yemen | 1918 | **Australia** | |
| Fiji | 1970 | N Caledonia | — | Syria | 1917† | Papua | 1975 |
| Tonga | 1970 | Reunion | — | Iraq | 1916† | Nauru | 1968 |
| Mauritius | 1968 | St Pierre | — | Albania | 1912 | **USA** | |
| Nauru | 1968 | Vanuatu | 1980 | Macedonia | 1912† | Palau | 1994 |
| Swaziland | 1968 | Djibouti | 1977 | Libya | 1911† | Philippines | 1946 |
| Yemen | 1967 | Comoros | 1975 | **Germany** | | **Yugoslavia** | |
| Barbados | 1966 | Algeria | 1962† | Burundi | 1918† | Bosnia | 1995† |
| Botswana | 1966 | Benin | 1960 | Namibia | 1918† | Slovenia | 1991† |
| Guyana | 1966 | Burkina Faso | 1960 | Poland | 1918† | **China** | |
| Lesotho | 1966 | Cameroon | 1960 | Rwanda | 1918† | Mongolia | 1921† |
| Gambia | 1965 | C African Rep | 1960 | Papua | 1915† | **Ethiopia** | |
| Maldives | 1965 | Chad | 1960 | Nauru | 1914† | Eritrea | 1993† |
| Malawi | 1964 | Congo | 1960 | Palau | 1914† | **Greece** | |
| Malta | 1964 | Cote D'Ivoire | 1960 | Samoa | 1914 | Cyprus | — |
| Tanzania | 1964 | Gabon | 1960 | **Portugal** | | **Hungary** | |
| Zambia | 1964 | Madagascar | 1960 | Macao | 1999 | Slovakia | 1918† |
| Kenya | 1963 | Mali | 1960 | Angola | 1975† | **N Zealand** | |
| Singapore | 1963 | Mauritania | 1960 | Cape Verde | 1975 | Samoa | 1962 |
| Jamaica | 1962 | Niger | 1960 | Mozambique | 1975 | **Pakistan** | |
| Trinidad | 1962 | Senegal | 1960 | Sao Tome | 1975 | Bangladesh | 1971† |
| Uganda | 1962 | Togo | 1960 | Guinea-Bissau | 1974 | **S Africa** | |
| Kuwait | 1961 | Guinea | 1958 | **Netherlands** | | Namibia | 1990† |
| Sierra Leone | 1961 | Morocco | 1956 | Aruba | — | **Spain** | |
| Cyprus | 1960 | Tunisia | 1956 | N Antilles | — | Eq Guinea | 1968 |
| Nigeria | 1960 | Laos | 1954† | Suriname | 1975 | | |
| Somalia | 1960 | Viet Nam | 1954† | Indonesia | 1949† | | |

Note: **Metropole** = colonizer, — = current colony, † = hostile separation