Neighbors matter: evidence on trade, growth and productivity

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Abstract

I employ a new instrument for nominal and real openness in growth regressions based on imports and exports of a country's neighbors. First-stage results show that, in cross section estimation, this instrument performs better than the geography-based variable proposed by Frankel and Romer (1999). Moreover, neighbors' trade is a valid and strong instrument also in a panel context. The structural equations show that trade exerts a positive and significant effect on both between- and within-country variations in income and productivity. The size of the coefficients of both measures of openness do not increase as global trade rises. These results hold even allowing for heterogeneous returns to trade across countries.

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1 Introduction

Is international trade, measured as the share of imports and exports over GDP, good for growth? The seminal work of Frankel and Romer (1999, henceforth FR) suggest that the answer is positive. They proposed for the first time an instrument, based on geography variables in a gravity equation, that was considered valid for trade in growth regressions. The geography-based instrument for trade has been widely employed, not only to estimate growth but also productivity (see Alcalà and Ciccone, 2004, that propose real openness as an alternative measure of international trade).

The debate on the impact of trade on growth is, however, far from over. The geography-based instrument raises some questions. The first one is about its validity: geography variables may impact growth also through channels other than openness, such as institutions and productivity. The second one is how to employ geography-based instrumental variables in panel estimation.

This paper proposes an alternative instrument for trade based on trade flows of a country's neighbors. Contrary to the FR variable, the new instrument can be meaningfully employed also in panel regressions[2]. Finally, I employ the newly constructed variable in combination with a recently developed estimation procedure (Wooldridge and Murtazashvili, 2003) that allows for heterogeneous returns to trade across countries.

Intuitively, trade relations of neighboring countries are likely correlated with home trade. Naturally, one has to make sure that such correlation does not arise spuriously, due to the trade flows between home and each neighbor. Netting out the "spurious component" of such correlation, we have a measure that captures if a country lies in a region populated with more open neighbors (that may induce Home to trade more through demand and

[2]Some studies used the FR in panel studies. In those cases, though, the time-varying varialbe was constructed through a succession of cross section estimations, one for each time period. It remains unclear how such studies would interpret the time variation of an instrument so constructed.

supply linkages). Moreover, regional trade varies in time, capturing "highs and lows" in world trade that are correlated with Home's openness.

Cross sectional evidence suggests that the new variable fares substantially better than the geography-based variable proposed by Frankel and Romer. Second-stage results are consistent with the evidence presented by Alcalà and Ciccone (2004) and show that, using either instrument, nominal openness is not a robust predictor of income per capita and labor productivity, but real openness is. In addition, both nominal and real openness impact positively and strongly on within-country variations in income and labor productivity.

Even allowing for country-specific coefficients, the Population Average Effect (PAE) of openness variables is always positive and highly significant both in income and productivity equations. Further analysis rules out that the returns to trade changed substantially as the global trade network grew with time.

The paper is structured as follows: section 2 provides a snaphot of related literature; section 3 describes the instrument and discusses some of its features; section 4 describes the estimation strategy and the data; section 5 presents the results; section 6 concludes.

2 Literature review

Empirical findings have generally shown a positive correlation between trade, defined in various ways, and per capita GDP growth[3]. Results have been questioned, though, and there is an ongoing debate about their robustness and validity. Trade policies have been investigated by the very influential paper by Sachs and Warner (1995) that construct an "openness index" based on five broad policy indicators and shows a strong positive correlation between this index and growth. Dollar (1992) finds a similar result highlighting a negative relationship between growth and real exchange rate departures from the law of

[3]Temple (2003) provides an excellent review of empirical growth studies, including the ones dealing explicitly with openness variables.

one price. Such departures were considered symptoms of more restrictive trade policies. Rodriguez and Rodrik (2001) show the pitfalls of both papers. The index developed by Sachs and Warner relies heavily on just one indicator, the state trading monopoly power over exports, that is present only in Sub-Saharan Africa countries. The positive impact of freer trade policies disappears when this indicator is excluded. Regarding Dollar's paper, Rodriguez and Rodrik show that deviations from the law of one price may be determined by factors other than trade policy, and that the paper's results are reversed if estimation is repeated with updated data.

Turning to more direct measures of trade, such as the fraction of imports and exports over GDP, most evidence is for a positive link between openness and growth, but questions are open on how reliable these results are. Levine and Renelt (1992) find a positive correlation between growth and openness, but claim that this result is mainly driven by the link between openness and investments and, in turn, investments and growth. In general, the authors show that most specification of growth regressions, including the ones containing proxies for trade, are very fragile with respect to small modifications of the list of the right-hand side variables.

The work by Mankiw, Romer and Weil (1992) on conditional convergence made clear that empirical research on trade and growth had to deal with a severe omitted variable bias problem. Trade might be correlated with unobserved elements that could have a high impact on growth (such as a country's transport infrastructure).

Frankel and Romer (1999) proposed an instrumental variable approach to estimate the impact of openness on growth in a cross section. They employed the predicted values of a gravity model (whose main variables are related to geography) as an instrument for the trade share of GDP. Their results show a very positive impact of openness on growth[4]. However, the debate about causation is not over. In fact, geographic variables may affect

[4]Interestingly, the coefficient they retrieve is higher than the OLS estimates.

growth and productivity not only through openness, but also through other factors such as political institutions, productivity and culture. Moreover, results in Rodrik, Submarian and Trebbi (2004) show that, using Frankel and Romer's methodology, when institutions are controlled for, openness ceases to be significant and shows even a negative sign in the structural equation.

The problem of unobserved heterogeneity was addressed by Islam (1995), that retrieved estimates of conditional convergence from a panel of 96 countries based on the Penn World Tables. He found a faster conditional converge rate than previous studies based on cross section techniques and, above all, started the interest for the determinants of country-specific productivities. Caselli, Esquivert and Lefort (1996) employed a Generalized Method of Moments (GMM) estimation for dynamic panel data using lagged values of the endogenous variables as instruments. Their results (a faster convergence rate than previously thought, particularly for open economies) were questioned by Bond, Hoeffler and Temple (2001). They show that the standard GMM estimator may be affected by weak instrument problems when series are persistent: lagged levels of the series are only weakly correlated with future first-differences. When partial correlation between the endogenous variable and the instrument is low, large biases usually arise in finite (but not necessarily small) samples. The authors then propose an extension of GMM ("system GMM") originally developed by Arellano and Bover (1995) and Blundell and Bond (1998). The system GMM adds a set of moment conditions to the first-difference GMM that makes it consistent even when series are persistent.

Dollar and Kraay (2003) employ GMM directly to the openness variable, instrumenting it with its past values. They show a positive and significant impact of trade openness on growth. Unfortunately, the underlying moment conditions are most likely violated: it is implausible that current growth is uncorrelated with past openness even conditioning for current openness.

3 Mind thy neighbors

Regional trade is not only a proxy for world trade, but is also the main propagation channel of country-specific shocks to neighbors. This paper exploits this intution to propose an instrument or openness based on neighbors' trade flows.

Neighbors openness captures the endogenous variation in home trade, unless the bilateral trade flows the negibors and home are netted out. Therefore, I do not employ neighbors' openness *per se*, but use the sum of their trade flows with the rest of the world only. In practice, my instrument is constructed as follows:

1. For each country i, take a neighboring country j
2. Sum up all country j's imports and exports
3. Take out j's imports and exports with country i
4. Repeat the same steps for all of i's neighbors and sum up the resulting "netted flows"

More formally, we can define openness as the sum of imports and exports over GDP: $openness_{it} = \frac{X_{it}+M_{it}}{GDP_{it}}$, where X_{it} is the value of country i's exports in time t and M_{it} is the value of its imports in time t. The instrument I propose is constructed as follows:

$$z_{it} = \sum_{J} \left(X_{j,-i} + M_{j,-i} \right)$$

Where J is the set of country i's neighbors. $X_{j,-i}$ is the exports of country j towards all countries in the world but i. Similarly, $M_{j,-i}$ is the sum of imports of j from all countries but i. Neighbors trade (net of trade flows with Home) has the obvious advantage that is relatively easy to construct. It is a good proxy for world trade flows: the correlation

between the sum of world trade and my instrument is .89 in my sample[5].

Naturally, the underlying identifying restriction of this paper is that the correlation beween neighbors openness home openness is high, while the one between neighbors openness and domestic growth is zero, conditioning on domestic openness and other observables. The first conditions is easy to test (even the raw correlation between openness at home and abroad is .52). Some issues deserve attention, though, regarding the second condition.

In fact, trade is a natural propagation channel of country specific shocks thanks to demand and supply linkages, that in turn are particularly strong among neighboring countries[6]. Even in cases where shocks are not country-specific, the identifying restriction may not be violated. Think of shocks to international trade costs: neighbors trade are then a proxy for Home's trade costs.

On the other hand, spatially correlated shocks to productivities may violate the identifying assumption. A positive shock would boost output both at home and abroad. Expanded output will then translate in higher trade. Another potential source of endogenous variation is the introduction of somewhat coordinated policies that impact both trade and income. Globalization has come in "waves", when many countries decided to boost their exposure to international trade almost contemporaneously and, sometimes, in a coordinated way. One can think of the GATT/WTO Rounds as good examples of such events. When coordination in trade policies translates in adoption of further economic policies in the single countries, some spurious correlation between foreign trade and home growth may arise. Indeed, the most recent trade agreements ususally include some "red

[5]Such high correlation may raise concerns that the instrument captures the endogenous, rather than the exogenous, variation of trade in time. As shown in Section 5.2, I add time dummies in all panel specifications to wipe out the endogenous correlation.

[6]Propagation may arise also because of learning effects. As open economies grow more, governments perceive that trade is beneficial and open up their frontiers. Opening to trade may thus be part of a learning process by governments and firms (see Buera *et al.* 2008 and the vast literature of "learning by exporting").

tape" measures that also impact domestic production not targeted for export. Again, both growth and trade would rise, the former because of growth-enhancing measures included in the agreements (or adopted to complement them), the latter because of lower trade barriers.

Importantly, the identifying assumption of zero correlation between the instrument and the dependent must hold *conditioned on observables*. Therefore, if one can control for potential sources of violation of such restriction, the instrument is still valid. In some specifications of my estimation, I add measures of neighbors income and growth to control for potential spatially correlated shocks to productivity. In other specifications, I explicitly control for GATT/WTO membership and for the number of trade agreeements both Home and its neighbors are involved in. Results are unchanged with respect to my baselines specification, supporting the validity of my instrument.

A difference between this instrument and both the usual openness measures and the FR instrument is that the one I propose is not normalized by country *i*'s GDP. Normalization by home's GDP assumes that a country trades more if regional trade is more relevant with respect to its economic size. This would make sense; on the other hand, the data suggest that home openness is more correlated to the absolute value of neighbors' trade, rather than its size relative to the home economy. As we will se, the addition of home GDP at the denominator of my instrument is not central to its features, nor to the discussion about its validity.

Moreover, normalization would raise the intriguing question of what to normalize with. Country size (land area) would make as much sense as home GDP, since larger countries may have more neighbors and the total trade flows captured by my instrument might be larger. I take an alternative route, though, and simply add GDP and land area as controls in some specifications[7].

[7]My instrument is not normalized by *i*'s neighbors GDP either. In this case, normalizing would include

An interesting advantage of the instrument proposed in this paper is that it provides a somewhat rough but straightforward way to test for the existence of network effects in opening to trade. If there are network effects, the marginal benefit of opening up to trade is increasing with global trade flows. Since world trade has been steadily increasing after World War II, a natural way to see if the benefits of trade have indeed increased with time is running the same estimation in different periods and test whether resulting coefficients differ[8].

4 Estimation and data

I estimate the following equation:

$$y_{it} = \alpha_i + \beta open_{it} + \gamma X_{it} + \delta N_{it} + w_t + \varepsilon_{it} \tag{1}$$

Where y_{it} is the log of per capita income of country i at time t, $open_{it}$ is the log of openness and X_{it} and N_{it} are two matrices of controls. a_i and w_t are, respectively, fixed country and time effects.

It is well known that estimates of all coefficients in (1) will be inconsistent, due to the correlation between $open_{it}$ and the error term ε_{it}.

A standard two-stage procedure is therefore applied. I first run the regression:

$$open_{it} = \alpha_i + \theta_1 z_{it} + \theta_2 X_{it} + \theta_3 N_{it} + w_t + u_{it} \tag{2}$$

Where z_{it} is the excluded instrument, constructed as described in the previous section: it is the sum of imports and exports of country i's neighbors, netted of trade between them

the output to be exported to country i in the instrument definition. Rather, I will include neighbors' GDP as control in some robustness specification. The main results will remain unchanged.

[8]Importantly, network effects can be distinguished from "scale effects", controlling for market size at home and abroad.

and country i. The linear projection of (2) is then plugged in (1) in place of $open_{it}$. The resulting second stage estimation yields consistent results for all coefficients, provided that z_{it} is uncorrelated with the ε_{it}.

In both stages, the same controls are applied. X_{it} captures time-varying characteristics of country i, such as (the log of) population, and an indicator for conflict. N_{it}contains a similar set of controls for the *neighbors* of country i. In particular, the (log of) sum of populations and of the neighbors GDP income are included.

To ensure results are robust, more controls are added in further specifcations. Additional variables capture the level of country i's nominal exchange rate against the dollar, the price level relative to the US, how democratic are its institutions, if the country is a GATT member, and the number of trade agreements, economic integration areas and custom unions country i is engaged in at time t. Controls are also added to account for the total number of trade agreements, integration areas and custom unions participated by country i's neighbors.

4.1 Heterogeneity

The potential presence of "network effects" induces to put extra caution when doing inference. If global trade changed the benefits one country exerts from opening, estimates in the structural equations would be inconsistent. An intuitive test of the "network" hypothesis is done by running the same regressions on sub-samples of my data, sorted by the size of my instrument. As noted above, it is convenient to exploit the high correlation between world trade flows and time, so that testing for "network effects" equates to looking for heterogeneous impacts of trade in time.

A second, important issue is whether there are heterogeneous responses to trade across countries. Wooldridge and Murtazashvili (2005) propose a simple procedure to deal with

this issue. Let us assume that the relations between trade and growth is best depicted with a Correlated Random Coefficient (CRC) model, where the impact of trade on growth is $b_i = \beta + d_i$. The authors show that, under weak conditions, we can retrieve consistent estimates of the Population Average Effects even neglecting individual specific slopes. This is possible if standard IV techniques are applied only after all the variables have been appropriately detrended. De-trending can be achieved simply regressing each variable separately on a common time trend (that can be arbitrary) and retrieving the residuals to use them in the final estimation.

More formally, let us simplify (1) and rewrite it as a CRC model:

$$y_{it} = w_t a_i + b_i x_{it} + \varepsilon_{it} \tag{3}$$

As above, here $b_i = \beta + d_i$. Here, x_{it} stands for the openness measure. Aggregate time variables are captured by the vector w_t and the individual-specific slopes on these variables are a_i. Both b_i and a_i are not assumed to be mean independent of x_{it}. We can use the expression for b_i to rewrite (3) as:

$$y_{it} = w_t a_i + \beta x_{it} + (d_i x_{it} + \varepsilon_{it}) \tag{4}$$

We can eliminate the a_i by regressing, for each i, y_{it} and x_{it} on w_t and using the residuals from these regressions, $\ddot{y}_{it}$and $\ddot{x}_{it}$, in the following equation:

$$\ddot{y}_{it} = \beta \ddot{x}_{it} + (d_i \ddot{x}_{it} + \ddot{\varepsilon}_{it}) = \beta \ddot{x}_{it} + \ddot{v}_{it} \tag{5}$$

Where $\ddot{v}_{it} \equiv d_i \ddot{x}_{it} + \ddot{\varepsilon}_{it}$. Now take the proposed instrument, z_{it}, and apply the same procedure described above to obtain the detrended values $\ddot{z}_{it}$. We can employ the latter variable as an instrument to estimate (5) and obtain consistent results, provided the

following moment condition holds:

$$E\left[\ddot{z}'_{it}, \ddot{v}\right] = 0, \ \forall t \tag{6}$$

Condition (6) requires a set of assumptions. The first one is a standard strict exogeneity assumption of the instrument variable:

$$E\left[\varepsilon_{it} | z_{it}, a_i, b_i\right] = 0, \ \forall t \tag{7}$$

Now consider the error component in (5) The crucial point here is that its second term is $d_i \ddot{x}_{it}$. To ensure that the detrended instrument is uncorrelated with $d_i \ddot{x}_{it}$, we have to impose that b_i is mean independent of all $\ddot{x}_{it}$.

$$E\left[b_i | \ddot{z}_{it}\right] = E\left[b_i\right] = \beta, \ \forall t \tag{8}$$

Assumption (8) is much weaker than full independence between the instrument and the slopes, since it allows b_i to be arbitrarily correlated with systematic components of z_{it}. In practice, mean independence is maintained only between the heterogeneous slopes and the deviations of the instrument from its long-run level[9]. To obtain consistent IV estimates, we need one more assumption:

$$Cov\left(\ddot{x}_{it}, b_i | \ddot{z}_{it}\right) = Cov\left(\ddot{x}_{it}, b_i\right), \ \forall t \tag{9}$$

Condition (9) allows the *unconditional* covariance between detrended variables and the individual specific slopes to be nonzero and even to change over time. In contrast, covariance *conditional* on the detrended instrument is assumed not to depend on $\ddot{z}_{it}$. Conditions (7)-(9), together with the usual rank condition on the detrended instrument, are

[9]The richer is w_t, the more likely will (8) hold, but there is a trade off with efficiency, because of loss in variation in the detrended instrument as more structure is put on w_t.

employed by Wooldridge and Murtazashvili to show that the fixed-effect IV estimator is consistent for β, provided a full set of time dummies is included in (5).

The procedure just described allows for controls in (5), provided the variables to be detrended are roughly continuous. I then apply the technique outlined here in section 4.3. I detrend all roughly continuous variables in my data using time and total world trade in each period. I obtain the yearly deviation of each variable from its long-term average. Only instrument's deviations from its systematic component should be mean independent from the individual slopes, and this looks a very plausible assumption.

4.2 Data

Trade data are taken from the publicly available NBER-United Nations Database (Feenstra and Lipsey, 2001), that contains bilateral trade flows covering the period 1962-2000. Values are in nominal thousands of dollars. The values for the FR instrument are taken directly by Frankel and Rose (2001), that update it up to 1995. From their dataset I also take measures of land area and distance from equator. GDP per capita is taken from the Penn World Tables, mark 6.2 (Heston *et al.*, 2006). I also evaluate my instrument against *real* openness, as defined by Alcalà and Ciccone (2004). They claim that nominal openness may be a biased measure of trade, due to cross country differnces in the price of non-traded goods. To overcome this problem, they suggest to correct the nominal opennes measure taking out the differences in prices of the nontradable. In practice, real openness is obtained multiplying openness at current prices by the ratio of the price levels (PPP) between the country of interest and a reference country (the US in the PWT).

Population, price level, exchange rate and growth data also come from the Penn World Tables. The political variable is the polity2 score contained in the Polity IV dataset (Marshall and Jaggers, 2007). The scores takes values from -10 (absolute autocracy) to +10

(completely democratic institutions). Conflict variables are taken from the Correlates of War (CoW) dataset (Sarkees, 2000). Data include interstate, extra-state and intrastate wars up to the year 2007. For my purposes, I classify any kind of war as a conflict for a given country and year.

International trade agreements (and their distinction in preferential trade agreements, economic integration areas and customs unions) are drawn from the WTO database of notified regional agreements as of 20 May 2008. A complete list of participating countries for each agreement can be found at http://www.wto.org/english/tratop_e/region_e/regfac_e.htm.

Border data are taken from the Direct Contiguity database (version 3.1) available on the website of the Correlates of Was Project (http://correlatesofwar.org.). The classification system for contiguous dyads is comprised of five categories, one for land contiguity and four for water contiguity. Land contiguity is defined as the intersection of the homeland territory of the two states in the dyad, either through a land boundary or a river, such as the Rio Grande in the case of the US-Mexico border. Water contiguity is divided into four categories, based on distances of 12, 24, 150, and 400 miles. Version 3.1 of the dataset spans the period 1816-2006. In my analysis, I employ contiguity measures such that two countries are considered neighbors if they share a land border or their reciprocal distance is less than 25 miles.

5 Results: growth, trade and productivity

To fix ideas, table 1 shows simple correlations between real per capital GDP, openness and real openness (both in log and levels). Correlations are computed for observations in 1995. Values are generally high. The proposed instrument (in logs) has a correlation of .32 with nominal openness in levels and of .52 with the same variable in logs. Correlations with real openness in logs and levels follows a similar pattern. Results are basically

unchanged when correlations are computed between the various openness measures and the instrument in levels.

(INSERT TABLE 1 HERE)

OLS results of a cross sectional regression of growth on trade are presented in Table 2. The dependent variable is the log of income per capita in 1995. Column (1) depicts the strong correlations between the log of trade over GDP and real percapita GDP growth. Column (2) adds controls referred to the internal features of each country, as population, the degree of democratization, and the occurrence of conflicts. A dummy variable captures whether a country is a GATT (WTO) member in 1995. Of these covariates, only conflict is weakly significant (and negative). Column (3) includes the price level relative to the United States and the exchange rate level (relative to the dollar), to control for potential price and currency distortions (or, put differently, to keep the real exchange rate fixed). It turns out that exchange rate appreciations depress growth. More importantly, the exchange rate and price variables considerably cut the point estimates of openness and weaken its significance. In Column (4), controls referring to each country's neighbors, such as their growth and population, are added. Continental dummies are included in Column (5). The final column adds discrete variables that capture the economic integration both at home and "at the borders". They are the number of Free Trade Agreements, Economic Integration Areas and Customs Unions into force for each country of interest and its neighbors. Being part of an Economic Integration Area significantly increases growth, but Customs Unions seem to act in the opposite way. Note also that the GATT variable, always positive, gains significance in the richer specifications. The key message up to now, though, is that nominal openness does not predict growth when monetary variables, such as exchange rates and prices, are included in the specification.

Columns (7)-(12) show similar specifications, but use the log of real openness instead of nominal openness as the main variable of interest. As expected, real openness is a

predictor of growth that is more robust to monetary swings. The estimated coefficient is always positive and very significant. Its size is slightly reduced as additional controls are included, but overall the point estimates are stable across specifications.

(INSERT TABLE 2 HERE)

5.1 IV: Cross sectional evidence

As previously noted, OLS estimates might be severely biased. The instrument based on neighbors openness, proposed above, is now implemented in a cross sectional context and compared to the "geographic" instrument constructed by Frankel and Romer (1999). To begin with, we show first stage results in Table 3: in Panel A the dependent variable is the log of imports plus exports over GDP in 1995. Columns (1) to (5) use my new instrument as the main explanatory variable; its coefficients are positive, very large in magnitude and highly significant: countries are more likely to trade more if their neighbors are more open. Estimates are stable across specifications, increasing slightly when geography and trade agreements controls are added. Country size, measured in terms of population, has the expected negative and significant coefficient on openness: larger countries benefit more from domestic market size and trade less outside their borders. The same holds true for neighbors market size.

(TABLE 3 AROUND HERE)

Columns (5) to (10) repeat the estimation using the geographic instrument for trade developed by Frankel and Romer. Their variable is positive and very significant in the "basic" specification, where the coefficient is very large in magnitude. Adding controls, though, drives the estimates down: the coefficient of the instrument drops from over 5 to around 1.4. Geographic controls and trade policy variables do not impact point estimates further but their significance drops at the 10% level. Overall, the performance of the FR

instrument is considerably lower than the instrument based on neighbors trade. As we will see, this translates in questionable performance in under- and weak identification tests.

Panel B shows results on real openness as defined by Alcalà and Ciccone (2004). Again, Columns (1)-(5) present results using the new instrument; in Columns (6)-(10) the FR instrument is employed. Here, both instruments are very significant in all specifications: the magnitude of the coefficient on neighbors openness is a bit more stable across columns, while the point estimates of the FR instrument for openness drops as new controls are added, and loses some significance in the broader specification. Note that the market size variable (both at home and abroad) is significant only when the new instrument is employed; in the FR specification, they have the expected sign but are, in general, not significant.

Table 4 shows results on the structural equation, estimated with 2SLS. The dependent variable is log of real per capita income in 1995. Panel A shows specifications that use nominal openness as the main explanatory variable. In Columns (1)-(5), the log of nominal openness is instrumented with the log of neighbors trade. The point estimates are somewhat higher than OLS results, but their magnitude and significance drop substantially when controls for exchange rates and prices (relative to the US) are added. This is consistent with Alcalà and Ciccone's claim: nominal openness does not take into account shifts in nontradable goods sector. When these are controlled for, the collinearities that are created invalidate the estimates.

Nominal appreciations seem to have a negative impact on income, even if they do not affect openness in the first stage regression. In the most complete specification of column (5), the polity2 score is negative and not significant: having a more democratic regime in 1995 did not matter for income. Conflict is negative and insignificant, while being a WTO member considerably increases income. Growth "at the border" has a negative and significant impact on GDP at home. Again, being part of a EIA is good for growth, but

Customs Unions seem to be detrimental.

Columns (6)-(10) show the same set of specifications, instrumenting nominal openness with the FR variable. Results are similar: nominal openness is not a robust determinant of income. The coefficient on trade is always higher than in Columns (1)-(6), so that estimates with our new instrument stand somewhere in between OLS and Frankel and Romer's findings.

(TABLE 4 AROUND HERE).

Panel B presents evidence with real openness. Columns (1)-(4) contain estimates on log of GDP per capita using the new variable as excluded instrument; Columns (7)-(10) show results based on the FR instrument. Consistently with recent literature (see Alcalà and Ciccone, 2003) real openness performs better in predicting growth and, particularly, productivity. This is evident when comparing Columns (5) and (6). They show structural estimates when the dependent variable is labor productivity (log of real GDP per worker): nominal openness is not significant, while real openness has a larger coefficient and is always significant. As expected, due to the high correlation between labor productivity and income, results are similar to specifications where log of real percapita GDP is the dependent variable.

A key argument in favor of the new instrument for trade is that it fares substantially better in a variety of tests shown at the bottom of both Panels of Table 4. The Underidentification-Test is the Kleibergeen-Paap rank test, whose statistic is robust to clustering within countries. The Weak Identification test is the Kleibergeen-Paap F-statistic, in turn robust to heteroskedasticity and serial correlation within countries. With nominal openness, Under-Identification tests range between 3.8 and 8.4, and are generally slightly better using the geographic instrument. Overall, they reject the null at the 1% or 5% level. But the Weak-Identification test is usually much higher using neighbors openness (ranging from 11.140 to 36.584) than using the FR instrument (in that case, they

are high in the simple specifications, but drop below 4, when controls are added). When the endogenous variable is real openness, both Under- and Weak-Identification tests show higher statistics, regardless of which instrument is used. Nonetheless, focusing on the specifications with more controls, the Weak-ID statistics is considerably higher when using the new instrument (33.5) rather then the FR one (11.3).

5.2 Panel estimates

As noted earlier, a key advantage of my instrument is its time-varying nature, that makes it useful also when studying within-country variations of income in time. In a panel context, neighbors trade is a natural proxy for world trade, thus it can picture the ”trailing” of a country openness on world trade flows. But the specificity of each country's neighbors are still crucial in determining its openness. I start showing pooled-OLS and fixed effects results in Table 5, without instrumenting trade. Openness is always positively impacting growth and its coefficient is very significant; POLS estimates are naturally larger than the ones obtain employing fixed-effects. In turn, fixed-effects estimates are stable across specifications. Real openness shows a systematically lower coefficient than nominal openness, but it is still very significant in all trials. Time dummies are included throughout. The political variable seem not to matter, but conflict significantly depresses growth. The same holds true for exchange rate appreciations. Interestingly, in this Table the log of population turns negative and significant in all specifications with fixed effects.

(TABLE 5 AROUND HERE)

Let us now turn to Panel-IV estimation, using neighbors trade as excluded instrument. Table 6 depicts First-stage results. The dependent variable is nominal openness in Columns (1)-(4) and real openness in Columns (5)-(9). The instrument is a strong predictor of both nominal and real openness; the coefficient is very large in size (about 1.5 for

nominal openness and 1.9 for real openness) and remarkably stable when adding controls. The polity2 score has a weakly positive impact on openness. Previous results that a country's population is inversely related with its openness are confirmed. Conflict is negative but not significant; being a GATT-WTO member is positive and insignificant. Entering a FTA is significantly positive, while Trade Agreements and Customs Unions joined by others depress home trade, perhaps due to trade diversion. Interestingly, though, the more Economic Integration Areas are joined by neighbors, the more the home country trades with the world.

(TABLE 6 AROUND HERE)

Table 7 presents estimates of the structural equation. Columns (1)-(5) use nominal openness as the main explanatory variable. Its estimated coefficients are always positive and very significant. Their size is much lower than simple POLS estimates in Table 5, but slightly higher than fixed effects estimates without instrumentation. Openness coefficients are also very stable across specifications. The negative impact of conflict, exchange rate appreciation and domestic population are confirmed. The political regime at home and population and growth abroad are not significant. Being part of the GATT impacts positively but not significantly on growth. The entry into force of an additional Free Trade Agreement does not impact growth, while being member of a Customs Union positively does. The creation of Economic Integration Areas that do not include the home country are detrimental to its growth.

Columns (6)-(10) repeat the same specifications with real openness in place of nominal openness. The estimated coefficients on this alternative measure of trade are always positive and very significant. They are also very stable and remarkably similar to the estimates with nominal openness. Results on controls broadly confirms the ones in preceding Columns.

(TABLE 7 AROUND HERE)

The last rows of Table 7 provide some tests on the quality of my instrument and on the reliability of inference based on it. Results for nominal openness are very encouraging also in this panel context: the LM Paap test of Under-identification always rejects the null at the 1% confidence level, and values of the tests statistics actually increase as more controls are added. The same holds true for the Kleibergeen-Paap F test for weak identification: the test statistics is always above the highest critical value, ranging from above 19 in the bare specification to over 29 when additional controls are added. Tests on real openness are equally reassuring, though the statistics are somewhat lower. Under-identification is always rejected at the 1% level and Weak Identification tests always exceeds the "second highest" critical value, being always well above the "rule of thumb" value of 10.

Table 8 presents the impact of openness on labor productivity in a panel framework. Recall that Table 4 indicated that cross section results are consistent with previous findings by Alcalà and Ciccone (2004): nominal openness shows a positive insignificant coefficient, and real openness is always a very good predictor of labor productivity. In panel estimates, the coefficient on nominal openness is generally larger than the one in real openness specifications, and it increases as additional controls are included. Both measures of openness are strongly and positively significant; real openness estimates are, again, stable across specifications. Instrument tests are passed with no problem: when regressing on real openness, the statistics of the weak identification tests falls somewhat, but remains well above the rule of thumb value of 10.

5.3 Heterogeneity

The results shown in previous sections may have to be checked with respect to two issues. On the one side, correlation between the instrument and the coefficients estimates

must be ruled out. On the other, single countries may react differently to trade openness, invalidating the previous findings.

Now, the correlation between time and the instrument is very high in my sample (.95). The mean value of my instrument reaches 22.72 in 2000, up from 19.41 in 1965, and the increase in monotonic in time. The sum of world trade flows shows a similar behavior and its correlation with the instrument is .89, as previously noted[10]. This implies that, if there are positive "network effects" of the global trade web, coefficients on openness should rise with time. In Table 9, I run cross sectional IV-regressions for each five-year time interval in my data. In Panel A the dependent variable is the log of real GDP per capita, in Panel B it is the log of labor productivity. Results show that the coefficients on nominal and real openness are always positive and significant; their size varies with time, but not dramatically. Importantly, values referring to more recent years are not higher than the ones obtained for older samples. Spikes occur in the years 1980-1984, but even then coefficients are not significantly different from their minimum values (incidentally, such minima occur in 1995). Coefficients vary more in the specifications where the log of GDP per worker is the dependent, but the relative stability of my estimates across time suggests that the correlation between the instrument and the structural coefficient is negligible. What's more, it seems that "network effects" of global trade flows are not in place in my sample.

Heterogenous responses to trade across countries are also possible. To investigate this issue, I follow the procedure proposed by Wooldridge and Murtazashvili (2005) and outlined in section 3.1. I detrend all variables[11] separately for each country, I estimate (5) instrumenting the detrended opennes measure with the detrended values of neighbors openness. This yields consistent estimates of the PAE even allowing for country-specific

[10]By contrast, the correlation between time and country-specific measure of openness is only .01.

[11]With this procedure, I can employ only roughly continous variables.

slopes and for correlation between the systematic component of the instrument and the individual coefficients. Results are presented in Table 10 and indicate that, even allowing for heterogeneous responses to trade across countries, the openness variable is always positive and highly significant.

5.4 Robustness

It is important that the results shown in previous sections do not depend on the specifications nor on arbitrary decisions made on the data. Having shown a variety of specifications in previous sections, here I focus on different definitions of what are the neighboring countries included in the construction of my instrument.

The baseline specifcation used above is that all countries that share a terrestrial border or whose coastal distance from country *i*'s coasts are its neighbors. Table 11 shows that the main results of both cross section and panel data estimations do not change if, in constructing my instrument, I consider as neighbors only the countries sharing a terrestrial border with country *i* (Columns 1-4). I also construct an alternative version of my instrument that includes a broader set of "neighboring countries": in Columns 5-8, all countries that not only share a terrestrial borders, but are also less than 540 miles from country i's are considered as its neighbors. Again, results are very similar to those of my baseline estimation.

6 Conclusion

Trade, measured both by nominal and real openness, impacts positively and very significantly on income, growth and labor productivity. This is true both in cross sectional regressions and in panel estimates. Estimation takes advantage of a new instrument that proxies world openness in a given year with the openness of one country's neighbors.

First-stage results show that this instrument performs much better in cross section estimation than the geography-based instrument proposed by Frankel and Romer. Moreover, the quality of the instrument is high even in panel-fixed effects estimation. At the structural level, trade exerts a positive and significant effect on within-country variations in income and productivity. These results hold even if we allow the coefficient on openness to be heterogeneous across countries.

A tentative analysis based on cross-section regressions across time rules out that the benefits of trade increase as the size of world trade increases: ”network effects” seem not to be in place.

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Table 1

Correlation between income, openness and instrument

Cross section in 1995

obs=81	Real pca GDP	log ofReal pca GDP	openness	log of openness	Real openness	log of real opennes	log of neighbours trade	neighbours trade
Real pca GDP	1.0000							
log ofReal pca GDP	0.9026	1.0000						
openness	0.6812	0.6260	1.0000					
log of openness	0.6542	0.6661	0.8028	1.0000				
Real openness	0.7046	0.6093	0.9349	0.6793	1.0000			
log of real opennes	0.7584	0.7518	0.8306	0.9694	0.7532	1.0000		
log of neighbours trade	0.4101	0.5591	0.3263	0.5224	0.3245	0.5286	1.0000	
neighbours trade	0.4357	0.5939	0.3474	0.5142	0.3540	0.5348	0.9923	1.0000

Table 2

OLS results on trade and income

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
COEFFICIENT	lrgdpch	lrgdpch	lrgdpch	lrgdpch	lrgdpch	lrgdpch	lrgdpch	lrgdpch	lrgdpch	lrgdpch	lrgdpch
Log of nominal openness	0.737***	0.680***	0.237*	0.204	0.176*	0.159					
	(0.144)	(0.172)	(0.139)	(0.143)	(0.0965)	(0.0985)					
Log of real openness							0.577***	0.547***	0.546***	0.464***	0.399***
							(0.0675)	(0.0839)	(0.0867)	(0.0817)	(0.0908)
polity2		0.0247	0.0122	0.0153	-0.00346	-0.00745		0.0180	0.0179	-0.00642	-0.0177
		(0.0185)	(0.0176)	(0.0160)	(0.0142)	(0.0172)		(0.0184)	(0.0174)	(0.0159)	(0.0196)
log of population		0.104	0.0539	0.00265	0.00255	-0.0200		0.103	0.0426	0.0359	0.00590
		(0.0712)	(0.0599)	(0.0588)	(0.0538)	(0.0821)		(0.0656)	(0.0609)	(0.0591)	(0.0777)
conflict		-0.684*	-0.470**	-0.356*	-0.360	-0.268		-0.551*	-0.431*	-0.424	-0.356
		(0.355)	(0.204)	(0.180)	(0.277)	(0.241)		(0.311)	(0.245)	(0.345)	(0.271)
log exchange rate			-0.131***	-0.122***	-0.0952***	-0.0969**					
			(0.0388)	(0.0327)	(0.0348)	(0.0379)					
price level relative to US			0.0138***	0.0146***	0.0137***	0.0139**					
			(0.00359)	(0.00358)	(0.00363)	(0.00564)					
gatt		0.172	0.0897	0.261	0.374*	0.429*		0.0729	0.286	0.439*	0.382
		(0.246)	(0.198)	(0.189)	(0.200)	(0.220)		(0.230)	(0.230)	(0.233)	(0.243)
neighbours' growth				-0.0181***	-0.0113***	-0.00989**			-0.0147***	-0.00737*	-0.00684
				(0.00337)	(0.00358)	(0.00415)			(0.00474)	(0.00437)	(0.00420)
log of neighbours' population				0.0910**	0.0363	0.0264			0.131***	0.0717	0.0624
				(0.0402)	(0.0429)	(0.0452)			(0.0437)	(0.0492)	(0.0491)
FTA						-0.193					-0.0672
						(0.125)					(0.131)
EIA						0.386*					0.472*
						(0.202)					(0.271)
CU						-0.532**					-0.375*
						(0.207)					(0.222)
neighbours' FTA						0.0368					-0.0162
						(0.0567)					(0.0593)
neighbours' EIA						0.00841					0.0680
						(0.0871)					(0.103)
neighbours' CU						0.0324					0.0825
						(0.0953)					(0.0909)
Geo controls					YES	YES				YES	YES
Observations	81	79	79	79	79	79	81	79	79	79	79
R-squared	0.444	0.509	0.678	0.748	0.794	0.816	0.565	0.603	0.673	0.744	0.776

Robust standard errors in parentheses

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

Table 3

First stage results - Cross section in 1995

Panel A - Dependent variable is log of nominal openness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
COEFFICIENT	logopen	logopen	logopen	logopen	logopen	logopen	logopen	logopen	logopen	logopen
log of neighbour's trade	3.386***	3.882***	3.821***	4.163***	4.134***					
	(1.025)	(1.075)	(1.093)	(1.130)	(1.214)					
FR geo insrument						5.221***	1.399***	1.047	1.372*	1.461*
						(0.751)	(0.526)	(0.643)	(0.686)	(0.770)
polity2		0.00618	0.0114	0.0145	0.0160		0.0208	0.0276	0.0232	0.0267
		(0.00932)	(0.00937)	(0.0134)	(0.0145)		(0.0160)	(0.0167)	(0.0239)	(0.0284)
log of population		-0.375***	-0.339***	-0.380***	-0.394***		-0.160***	-0.140***	-0.147***	-0.161**
		(0.0726)	(0.0699)	(0.0771)	(0.0824)		(0.0528)	(0.0504)	(0.0520)	(0.0617)
conflict		0.147	0.131	0.153	0.209		-0.143	-0.120	-0.123	-0.0213
		(0.291)	(0.277)	(0.297)	(0.310)		(0.258)	(0.213)	(0.212)	(0.248)
log exchange rate		0.00919	-0.00450	0.0101	0.00270		-0.0684	-0.0817*	-0.0609	-0.0661
		(0.0241)	(0.0244)	(0.0228)	(0.0265)		(0.0434)	(0.0443)	(0.0563)	(0.0612)
price level relative to US		0.0127***	0.0113***	0.0102***	0.00945**		0.0139***	0.0128***	0.0127***	0.0151***
		(0.00236)	(0.00236)	(0.00271)	(0.00436)		(0.00216)	(0.00228)	(0.00254)	(0.00417)
gatt		-0.197	-0.277*	-0.320*	-0.290		0.0281	-0.0351	-0.0557	0.0569
		(0.165)	(0.164)	(0.172)	(0.186)		(0.262)	(0.250)	(0.240)	(0.274)
neighbours' growth			-0.00246	-0.00136	-0.00137			-0.00887*	-0.00673	-0.00549
			(0.00264)	(0.00290)	(0.00342)			(0.00461)	(0.00671)	(0.00675)
log of neighbours' population			-0.0877**	-0.120***	-0.125**			-0.0784*	-0.116**	-0.122**
			(0.0359)	(0.0451)	(0.0488)			(0.0430)	(0.0531)	(0.0604)
FTA					0.00185					-0.134
					(0.118)					(0.131)
EIA					0.0797					0.0519
					(0.174)					(0.230)
CU					-0.0390					-0.378*
					(0.216)					(0.220)
bfta					0.0357					0.0804
					(0.0530)					(0.0607)
beia					-0.00842					-0.0478
					(0.0828)					(0.0981)
bcu					-0.0439					-0.0597
					(0.0645)					(0.0992)
Geo controls				YES	YES				YES	YES
Observations	82	80	80	80	80	76	75	75	75	75
R-squared	0.266	0.750	0.769	0.795	0.800	0.262	0.576	0.606	0.620	0.641

Robust standard errors in parentheses

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

Panel B - Dependent variable is log of real openness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
COEFFICIENT	lreal	lreal	lreal	lreal	lreal	lreal	lreal	lreal	lreal	lreal
log of neighbour's trade	4.967***	6.659***	6.565***	6.533***	5.958***					
	(1.135)	(0.994)	(1.050)	(0.949)	(1.024)					
FR geo insrument						7.835***	6.027***	5.387***	5.364***	3.689**
						(1.136)	(1.059)	(1.318)	(1.582)	(1.762)
polity2		0.0347*	0.0421**	0.0321	0.0219		0.0652**	0.0742***	0.0421	0.0374
		(0.0181)	(0.0184)	(0.0213)	(0.0198)		(0.0248)	(0.0248)	(0.0334)	(0.0360)
lpop		-0.561***	-0.488***	-0.539***	-0.577***		-0.141	-0.104	-0.135	-0.241**
		(0.0902)	(0.0870)	(0.0759)	(0.0834)		(0.0864)	(0.0756)	(0.0817)	(0.101)
conflict		-0.103	-0.131	-0.0453	0.119		-0.756*	-0.739*	-0.692*	-0.455
		(0.518)	(0.511)	(0.555)	(0.514)		(0.447)	(0.435)	(0.353)	(0.370)
gatt		-0.00675	-0.210	-0.143	-0.362		0.242	0.0964	0.0973	-0.0572
		(0.279)	(0.292)	(0.298)	(0.280)		(0.369)	(0.352)	(0.354)	(0.386)
sumg			-0.00379	-0.000106	-0.00319			-0.0115**	-0.00622	-0.00837
			(0.00479)	(0.00447)	(0.00518)			(0.00563)	(0.00748)	(0.00882)
lsumpop			-0.178***	-0.195**	-0.208***			-0.138*	-0.147	-0.205**
			(0.0634)	(0.0790)	(0.0623)			(0.0751)	(0.104)	(0.0860)
FTA					0.374***					0.317*
					(0.138)					(0.163)
EIA					0.350					0.479
					(0.273)					(0.316)
CU					-0.00890					-0.563
					(0.287)					(0.361)
bfta					0.0231					0.0438
					(0.0799)					(0.0964)
beia					0.0223					-0.00698
					(0.126)					(0.151)
bcu					0.175*					0.262*
					(0.102)					(0.153)
Geo controls				YES	YES				YES	YES
Observations	82	80	80	80	80	76	75	75	75	75
R-squared	0.277	0.586	0.626	0.706	0.796	0.286	0.403	0.438	0.520	0.609

Robust standard errors in parentheses

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

Table 4

Structural estimation - Cross section in 1995

Panel A - Dependent variable is log real GDP per capita

	Instrument is neighbours' openness					Instrument is FR geo				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
log of nominal openness	1.184***	0.879***	0.522*	0.303*	0.264	1.065***	1.156***	0.916*	0.489	0.404
	(0.435)	(0.281)	(0.297)	(0.180)	(0.170)	(0.134)	(0.213)	(0.552)	(0.412)	(0.317)
polity2		0.0139	0.00719	-0.00690	-0.00867		-0.00387	-0.00203	-0.0127	-0.0131
		(0.0186)	(0.0162)	(0.0134)	(0.0151)		(0.0244)	(0.0225)	(0.0185)	(0.0196)
log of population		0.152*	0.107	0.0232	0.00295		0.189**	0.153	0.0392	0.0194
		(0.0853)	(0.0740)	(0.0563)	(0.0730)		(0.0866)	(0.106)	(0.0754)	(0.0919)
conflict		-0.571	-0.428*	-0.346	-0.265		-0.439	-0.412	-0.327	-0.285
		(0.407)	(0.249)	(0.263)	(0.225)		(0.385)	(0.321)	(0.260)	(0.228)
log exchange rate			-0.111***	-0.0856***	-0.0912***			-0.0562	-0.0525	-0.0598
			(0.0361)	(0.0307)	(0.0319)			(0.0621)	(0.0488)	(0.0444)
price level relative to US			0.00910	0.0119***	0.0124**			0.00385	0.0111*	0.0122*
			(0.00591)	(0.00422)	(0.00581)			(0.00913)	(0.00669)	(0.00726)
gatt		0.121	0.0821	0.378**	0.421**		0.0675	0.0717	0.420**	0.420**
		(0.236)	(0.205)	(0.183)	(0.188)		(0.312)	(0.273)	(0.206)	(0.214)
neighbours' growth				-0.0104***	-0.00969***				-0.00982*	-0.00986**
				(0.00341)	(0.00363)				(0.00526)	(0.00443)
log of neighbours' population				0.0535	0.0364				0.0810	0.0641
				(0.0451)	(0.0429)				(0.0800)	(0.0654)
FTA					-0.162					-0.119
					(0.114)					(0.122)
EIA					0.385**					0.374*
					(0.183)					(0.193)
CU					-0.522***					-0.356*
					(0.185)					(0.208)
bfta					0.0320					0.0168
					(0.0498)					(0.0564)
beia					-0.00584					-0.0298
					(0.0756)					(0.0816)
bcu					0.0390					0.0388
					(0.0821)					(0.0841)
Geo controls				YES	YES				YES	YES
Observations	81	79	79	79	79	75	74	74	74	74
R-squared	0.280	0.484	0.650	0.789	0.809	0.400	0.395	0.533	0.768	0.793
Robust standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										
UnderID test (Paap)	4.820	8.457	4.308	3.895	3.780	8.675	7.596	4.172	4.713	4.179
Kleibergeen-Paap F	11.140	36.584	12.543	13.131	11.273	48.415	32.754	8.007	3.795	3.918

Panel B - Dependent variable is log of GDP per capita (lrgdpch) or log of GDP per worker (logwok)

	Instrument is neighbours' openness						Instrument is FR geo			
	(1)	(2)	(3)	(5)	(7)	(8)	(6)	(9)	(10)	(11)
Dependent	lrgdpch	lrgdpch	lrgdpch	lrgdpch	logwok	logwok	lrgdpch	lrgdpch	lrgdpch	lrgdpch
log of nominal openness					0.279					
					(0.212)					
log of real openness	0.811***	0.652***	0.590***	0.454***		0.468***	0.713***	0.761***	0.778***	0.651***
	(0.220)	(0.162)	(0.157)	(0.129)		(0.168)	(0.0838)	(0.131)	(0.105)	(0.111)
polity2		0.00962	0.0140	-0.0161	-0.0158	-0.0251		-0.00257	-0.00672	-0.0152
		(0.0180)	(0.0180)	(0.0170)	(0.0153)	(0.0181)		(0.0210)	(0.0211)	(0.0179)
log of population		0.135*	0.0526	0.0302	0.0251	0.0427		0.140**	0.0749	0.0659
		(0.0723)	(0.0620)	(0.0755)	(0.0848)	(0.0926)		(0.0691)	(0.0605)	(0.0609)
conflict		-0.452	-0.393	-0.341	-0.181	-0.260		-0.365	-0.239	-0.290
		(0.362)	(0.280)	(0.260)	(0.234)	(0.289)		(0.329)	(0.234)	(0.283)
gatt		0.0205	0.272	0.371*	0.274	0.234		0.00440	0.283	0.415*
		(0.222)	(0.217)	(0.211)	(0.206)	(0.228)		(0.255)	(0.248)	(0.214)
neighbours' growth			-0.0139***	-0.00715*	-0.0118***	-0.00941**			-0.0108*	-0.00718
			(0.00498)	(0.00376)	(0.00363)	(0.00374)			(0.00560)	(0.00508)
log of neighbours' population			0.138***	0.0656	0.0281	0.0649			0.162***	0.107**
			(0.0471)	(0.0507)	(0.0459)	(0.0548)			(0.0518)	(0.0520)
FTA				-0.0469	-0.164	-0.0555				
				(0.120)	(0.123)	(0.134)				
EIA				0.460*	0.487***	0.556**				
				(0.246)	(0.184)	(0.255)				
CU				-0.394**	-0.485***	-0.370*				
				(0.200)	(0.187)	(0.192)				
bfta				-0.0149	0.0196	-0.0268				
				(0.0511)	(0.0548)	(0.0544)				
beia				0.0310	-0.00159	0.0342				
				(0.0877)	(0.0779)	(0.0890)				
bcu				0.0783	0.0462	0.0868				
				(0.0784)	(0.0846)	(0.0838)				
Geo controls			YES	YES	YES	YES			YES	YES
Observations	81	79	79	79	77	77	75	74	74	74
R-squared	0.472	0.589	0.670	0.766	0.794	0.744	0.580	0.580	0.644	0.725
Robust standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										
UnderID test (Paap)	7.330	12.020	11.976	6.503	3.333	5.300	8.347	7.572	9.233	11.789
Kleibergeen-Paap F	19.235	44.949	39.009	33.554	11.101	31.211	47.447	31.292	16.199	11.336

Table 5

POLS e Panel-FE: dependent is log of real GDP per capita

COEFFICIENT	(1) POLS	(2) POLS	(3) FE	(4) FE	(5) FE	(6) FE	(7) FE	(8) POLS	(9) POLS	(10) FE	(11) FE	(12) FE	(13) FE
Log of nominal openness	0.726***	0.610***	0.168***	0.120***	0.123***	0.122***	0.137***						
	(0.0361)	(0.0499)	(0.0398)	(0.0319)	(0.0358)	(0.0349)	(0.0370)						
Log of real openness								0.528***	0.439***	0.0832***	0.0494**	0.0485**	0.0578***
								(0.0281)	(0.0367)	(0.0210)	(0.0206)	(0.0205)	(0.0204)
polity2		0.0404***		-0.00208	-0.0000666	0.000106	-0.00241		0.0396***		-0.000174	-0.0000905	-0.00156
		(0.00610)		(0.00502)	(0.00496)	(0.00497)	(0.00456)		(0.00637)		(0.00499)	(0.00501)	(0.00488)
log of population		-0.0201		-0.743***	-0.739***	-0.765***	-0.882***		-0.0439		-0.797***	-0.817***	-0.891***
		(0.0269)		(0.141)	(0.144)	(0.160)	(0.176)		(0.0288)		(0.150)	(0.163)	(0.185)
conflict		-0.187**		-0.101***	-0.101***	-0.101***	-0.102***		-0.223**		-0.102***	-0.102***	-0.0998***
		(0.0883)		(0.0347)	(0.0337)	(0.0339)	(0.0335)		(0.0947)		(0.0356)	(0.0357)	(0.0360)
log exchange rate		-0.0534***			-0.0165**	-0.0167**	-0.0231***						
		(0.00617)			(0.00777)	(0.00786)	(0.00778)						
price level relative to US		-0.000424			-0.000209	-0.000215	-0.000232						
		(0.000457)			(0.000279)	(0.000272)	(0.000241)						
gatt		0.0125		0.0296	0.0252	0.0268	0.0389		0.0531		0.0357	0.0367	0.0467
		(0.0851)		(0.0622)	(0.0587)	(0.0585)	(0.0561)		(0.0887)		(0.0637)	(0.0635)	(0.0636)
neighbours' growth		0.00463				-0.00170	-0.00206		0.00340			-0.00195	-0.00244
		(0.00507)				(0.00164)	(0.00162)		(0.00524)			(0.00183)	(0.00188)
log of neighbours' population		0.0662***				0.0295	0.0311		0.0798***			0.0222	-0.00467
		(0.0199)				(0.109)	(0.108)		(0.0190)			(0.110)	(0.115)
FTA		0.00488					-0.0198		-0.0176				-0.0179
		(0.0380)					(0.0303)		(0.0364)				(0.0302)
EIA		0.143					0.0122		0.165*				0.0198
		(0.0985)					(0.0473)		(0.0921)				(0.0445)
CU		-0.0530					0.0923		-0.0328				0.0955
		(0.0890)					(0.0648)		(0.0849)				(0.0679)
neighbours' FTA		0.0212					0.00794		0.0165				0.0106
		(0.0148)					(0.00999)		(0.0149)				(0.0111)
neighbours' EIA		0.0137					-0.0487**		0.00687				-0.0419*
		(0.0419)					(0.0235)		(0.0417)				(0.0249)
neighbours' CU		0.00291					0.0175		0.0210				-0.0185
		(0.0353)					(0.0227)		(0.0356)				(0.0230)
Observations	545	541	545	541	541	541	541	545	541	545	541	541	541
Number of countries			83	82	82	82	82			83	82	82	82
R-squared	0.412	0.575	0.297	0.411	0.431	0.433	0.460	0.437	0.537	0.257	0.387	0.390	0.407

Clustered standard errors in parentheses

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

Table 6

IV Panel-FE: first stage regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent	log nominal openness	log nominal openness	log nominal openness	log nominal openness	log real openness	log real openness	log real openness	log real openness	log real openness
log of neighbour's trade	1.588***	1.642***	1.526***	1.520***	1.876***	1.950***	1.962***	1.968***	1.909***
	(0.389)	(0.382)	(0.306)	(0.309)	(0.649)	(0.647)	(0.631)	(0.650)	(0.637)
polity2		0.0176**	0.0190**	0.0191**		0.0100	0.0147	0.00984	0.0188*
		(0.00708)	(0.00865)	(0.00861)		(0.0108)	(0.0119)	(0.0107)	(0.0109)
log of population		-1.012***	-0.952***	-0.886***		-1.218***	-1.211***	-1.159**	-0.592
		(0.238)	(0.211)	(0.231)		(0.417)	(0.392)	(0.483)	(0.474)
conflict		-0.0242	-0.0303	-0.0318		-0.0934	-0.0941	-0.0942	-0.114
		(0.0603)	(0.0567)	(0.0574)		(0.0973)	(0.0986)	(0.0979)	(0.0961)
gatt		0.102	0.0955	0.0893		0.126	0.116	0.121	0.0386
		(0.108)	(0.110)	(0.110)		(0.164)	(0.159)	(0.168)	(0.148)
neighbours' growth				0.000206				0.00217	0.00395
				(0.00225)				(0.00287)	(0.00315)
log of neighbours' population				-0.0904				-0.0820	-0.0387
				(0.145)				(0.266)	(0.265)
FTA									0.0964*
									(0.0515)
EIA									0.0464
									(0.0962)
CU									0.0156
									(0.124)
bfta									-0.0356**
									(0.0138)
beia									0.150***
									(0.0361)
bcu									-0.0808**
									(0.0363)
log exchange rate			-0.00291	-0.00296			-0.0365		
			(0.00922)	(0.00928)			(0.0225)		
price level relative to US			0.00231*	0.00231*					
			(0.00126)	(0.00125)					
Observations	551	547	547	547	551	547	547	547	547
Number of ccode	83	82	82	82	83	82	82	82	82
R-squared	0.285	0.362	0.418	0.419	0.252	0.298	0.313	0.299	0.350

Clustered standard errors in parentheses

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

Table 7

IV Panel-FE: structural equation (dependent is log of real GDP per capita)

COEFFICIENT	(1) lrgdpch	(2) lrgdpch	(3) lrgdpch	(4) lrgdpch	(5) lrgdpch	(6) lrgdpch	(7) lrgdpch	(8) lrgdpch	(9) lrgdpch	(10) lrgdpch
log of nominal openness	0.242***	0.269***	0.294***	0.290***	0.290***					
	(0.0880)	(0.0841)	(0.0903)	(0.0922)	(0.0909)					
log of real openness						0.206**	0.228***	0.229***	0.223***	0.235***
						(0.0808)	(0.0792)	(0.0797)	(0.0797)	(0.0844)
polity2		-0.00530	-0.00390	-0.00377	-0.00646		-0.00265	-0.00149	-0.00131	-0.00431
		(0.00399)	(0.00414)	(0.00420)	(0.00424)		(0.00379)	(0.00395)	(0.00396)	(0.00412)
log of population		-0.607***	-0.593***	-0.639***	-0.800***		-0.597***	-0.592***	-0.635***	-0.860***
		(0.136)	(0.138)	(0.143)	(0.143)		(0.156)	(0.157)	(0.164)	(0.158)
conflict		-0.0900***	-0.0879***	-0.0874***	-0.0895***		-0.0752**	-0.0753**	-0.0754**	-0.0693*
		(0.0294)	(0.0289)	(0.0289)	(0.0281)		(0.0359)	(0.0356)	(0.0353)	(0.0357)
log exchange rate			-0.0166***	-0.0167***	-0.0251***			-0.00914*	-0.00939*	-0.0170***
			(0.00466)	(0.00469)	(0.00509)			(0.00544)	(0.00546)	(0.00538)
price level relative to US			-0.000687*	-0.000681*	-0.000657*					
			(0.000366)	(0.000363)	(0.000354)					
gatt		0.0140	0.00858	0.0124	0.0294		0.0123	0.00955	0.0130	0.0416
		(0.0422)	(0.0400)	(0.0397)	(0.0377)		(0.0531)	(0.0529)	(0.0526)	(0.0507)
neighbours' growth				-0.000974	-0.00145				-0.00132	-0.00229
				(0.00129)	(0.00128)				(0.00144)	(0.00143)
log of neighbours' population				0.0539	0.0571				0.0463	0.0248
				(0.0697)	(0.0687)				(0.0712)	(0.0697)
FTA					-0.0247					-0.0340
					(0.0216)					(0.0224)
EIA					0.000732					-0.000718
					(0.0361)					(0.0356)
CU					0.105*					0.0705
					(0.0576)					(0.0601)
bfta					0.00871					0.0167**
					(0.00617)					(0.00767)
beia					-0.0536***					-0.0780***
					(0.0157)					(0.0210)
bcu					0.0260					0.0185
					(0.0188)					(0.0201)
Observations	543	539	539	539	539	543	539	539	539	539
Number of ccode	81	80	80	80	80	81	80	80	80	80
R-squared	0.281	0.354	0.363	0.369	0.408	0.170	0.214	0.217	0.231	0.266
	Clustered standard errors in parentheses									
	*** p<0.01, ** p<0.05, * p<0.1									
Underidentification LM (Paap)	10.966	10.843	14.349	14.216	13.991	8.193	8.228	8.499	8.658	8.214
Weak ID test (Kleibergeen-Paap F)	19.473	20.406	29.293	29.009	28.591	12.790	13.171	13.741	13.950	12.749

Table 8

IV Panel-FE: structural equation (dependent is log of real GDP per worker)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
log of nominal openness	0.193**	0.219***	0.242***	0.243***	0.246***					
	(0.0825)	(0.0775)	(0.0841)	(0.0865)	(0.0852)					
log of real openness						0.163**	0.184***	0.186***	0.185**	0.197**
						(0.0740)	(0.0713)	(0.0718)	(0.0728)	(0.0767)
polity2		-0.00414	-0.00252	-0.00260	-0.00577		-0.00203	-0.000556	-0.000554	-0.00398
		(0.00380)	(0.00390)	(0.00396)	(0.00403)		(0.00356)	(0.00369)	(0.00370)	(0.00387)
log of population		-0.582***	-0.569***	-0.622***	-0.799***		-0.575***	-0.570***	-0.620***	-0.852***
		(0.139)	(0.140)	(0.144)	(0.146)		(0.156)	(0.158)	(0.166)	(0.163)
conflict		-0.0922***	-0.0901***	-0.0888***	-0.0906***		-0.0803**	-0.0802**	-0.0791**	-0.0737**
		(0.0289)	(0.0283)	(0.0283)	(0.0276)		(0.0339)	(0.0335)	(0.0334)	(0.0337)
log exchange rate			-0.0177***	-0.0177***	-0.0256***			-0.0115**	-0.0115**	-0.0185***
			(0.00399)	(0.00404)	(0.00453)			(0.00486)	(0.00492)	(0.00489)
price level relative to US			-0.000626*	-0.000631*	-0.000597*					
			(0.000344)	(0.000344)	(0.000334)					
gatt		-0.0464	-0.0510	-0.0453	-0.0294		-0.0452	-0.0473	-0.0420	-0.0154
		(0.0478)	(0.0445)	(0.0440)	(0.0417)		(0.0579)	(0.0576)	(0.0577)	(0.0555)
neighbours' growth				-0.000344	-0.000823				-0.000606	-0.00151
				(0.00128)	(0.00127)				(0.00141)	(0.00139)
log of neighbours' population				0.0706	0.0656				0.0647	0.0382
				(0.0663)	(0.0654)				(0.0706)	(0.0691)
FTA					-0.0309					-0.0384*
					(0.0198)					(0.0211)
EIA					-0.0111					-0.0130
					(0.0322)					(0.0322)
CU					0.119**					0.0886
					(0.0527)					(0.0544)
bfta					0.00887					0.0157**
					(0.00583)					(0.00736)
beia					-0.0506***					-0.0715***
					(0.0151)					(0.0200)
bcu					0.0163					0.00949
					(0.0171)					(0.0181)
Observations	537	533	533	533	533	537	533	533	533	533
Number of ccode	80	79	79	79	79	80	79	79	79	79
R-squared	0.240	0.327	0.344	0.346	0.392	0.147	0.207	0.215	0.219	0.261
Clustered standard errors in parentheses										
*** p<0.01, ** p<0.05, * p<0.1										
Underidentification LM (Paap)	10.764	10.688	14.129	14.022	13.848	8.134	8.193	8.462	8.626	8.216
Weak ID test (Kleibergeen-Paap F)	19.095	20.097	28.769	28.549	28.278	12.714	13.134	13.698	13.913	12.774

Table 9
Cross section estimates on sequenced five-year averages

Panel A: dependent variables are log of per capital GDP (lrgdpch) or log real GDP per worker (logwok)

	1970		1975		1980		1985		1990		1995	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
COEFFICIENT	lrgdpch	logwok	lrgdpch	logwok	lrgdpch	logwok	lrgdpch	logwok	lrgdpch	logwok	lrgdpch	logwok
log of nominal openness	0.524***	0.682***	0.555***	0.675***	0.751***	0.861***	0.625***	0.681***	0.714***	0.813***	0.514**	0.510**
	(0.183)	(0.215)	(0.119)	(0.142)	(0.184)	(0.227)	(0.0982)	(0.116)	(0.132)	(0.140)	(0.213)	(0.257)
polity2	0.0250	0.0231	0.0287**	0.0270*	0.0158	0.0138	0.0300*	0.0284*	0.00478	0.00357	-0.00634	-0.0186
	(0.0174)	(0.0186)	(0.0144)	(0.0143)	(0.0140)	(0.0142)	(0.0153)	(0.0172)	(0.0125)	(0.0145)	(0.0164)	(0.0171)
log of population	-0.0699	-0.0454	-0.0767	-0.0481	0.00133	0.0385	0.00376	0.0363	0.0431	0.0861	0.0350	0.0287
	(0.0759)	(0.0935)	(0.0651)	(0.0729)	(0.0618)	(0.0768)	(0.0490)	(0.0605)	(0.0534)	(0.0645)	(0.0740)	(0.0815)
conflict	-0.120	-0.00580	-0.0671	-0.0295	0.0709	0.117	-0.0577	-0.0453	0.189	0.265*	-0.0619	-0.0231
	(0.177)	(0.211)	(0.197)	(0.224)	(0.220)	(0.234)	(0.167)	(0.180)	(0.140)	(0.143)	(0.197)	(0.232)
log exchange rate	-0.0403***	-0.0447***	-0.0367***	-0.0419***	-0.00843	-0.00816	-0.0320*	-0.0411**	-0.0668**	-0.0601**	-0.0707***	-0.0720***
	(0.0125)	(0.0131)	(0.0127)	(0.0132)	(0.0175)	(0.0172)	(0.0190)	(0.0207)	(0.0268)	(0.0277)	(0.0248)	(0.0272)
price level relative to US	-0.00153	-0.00145	-0.00192***	-0.00198***	-0.00258***	-0.00262***	-0.00222***	-0.00203***	0.00306***	0.00427***	0.0116*	0.0119*
	(0.00154)	(0.00185)	(0.000685)	(0.000697)	(0.000698)	(0.000765)	(0.000613)	(0.000636)	(0.00104)	(0.00143)	(0.00654)	(0.00642)
gatt	0.0614	-0.0515	0.00473	-0.102	0.0629	-0.0390	-0.0446	-0.132	0.425**	0.248	0.449**	0.377*
	(0.215)	(0.244)	(0.190)	(0.206)	(0.190)	(0.215)	(0.171)	(0.190)	(0.188)	(0.198)	(0.179)	(0.197)
neighbours' growth	0.0193	0.0255	0.00238	0.00567	-0.0251*	-0.0321**	-0.0297*	-0.0345*	0.00811	0.0123	-0.00234	0.00128
	(0.0149)	(0.0157)	(0.0161)	(0.0163)	(0.0134)	(0.0159)	(0.0173)	(0.0189)	(0.0106)	(0.0118)	(0.0135)	(0.0140)
log of neighbours' population	-0.0542	-0.0517	-0.0728	-0.0801	0.0685	0.0825	0.0221	0.0119	0.0434	0.0242	0.0555	0.0543
	(0.0792)	(0.0899)	(0.0528)	(0.0576)	(0.0637)	(0.0666)	(0.0481)	(0.0553)	(0.0471)	(0.0512)	(0.0520)	(0.0527)
FTA	0.221	0.291	0.00232	0.0807	-0.0549	0.00363	0.103	0.119	-0.00426	-0.0694	-0.0929	-0.0782
	(0.189)	(0.213)	(0.373)	(0.378)	(0.258)	(0.240)	(0.221)	(0.207)	(0.0961)	(0.102)	(0.0735)	(0.0792)
EIA	0.413	1.143*	0.556	1.017	1.012**	1.016**	0.214	0.209	0.294	0.371	0.167	0.184
	(0.552)	(0.606)	(0.569)	(0.662)	(0.504)	(0.499)	(0.361)	(0.362)	(0.246)	(0.254)	(0.143)	(0.148)
CU	-0.733	-1.376**	-0.914	-1.370**	-1.194***	-1.191***	-0.545**	-0.480**	-0.421*	-0.367	-0.0432	-0.0490
	(0.543)	(0.601)	(0.599)	(0.675)	(0.416)	(0.429)	(0.214)	(0.227)	(0.248)	(0.257)	(0.114)	(0.128)
bfta	0.267***	0.264**	0.191	0.205*	0.152	0.169*	0.154	0.228**	-0.00576	-0.00440	0.0411*	0.0424
	(0.0990)	(0.106)	(0.118)	(0.119)	(0.108)	(0.102)	(0.0996)	(0.0916)	(0.0611)	(0.0675)	(0.0241)	(0.0280)
beia	-0.340	-0.672*	-0.188	-0.457	-0.323	-0.442	-0.145	-0.317	0.0296	0.00428	-0.0316	-0.0324
	(0.305)	(0.343)	(0.366)	(0.395)	(0.265)	(0.291)	(0.263)	(0.260)	(0.0952)	(0.0979)	(0.0697)	(0.0740)
bcu	0.189	0.443	0.195	0.369	0.304	0.321	0.0310	0.0448	0.0149	0.0323	-0.0471	-0.0611
	(0.259)	(0.289)	(0.289)	(0.318)	(0.230)	(0.240)	(0.143)	(0.152)	(0.0697)	(0.0674)	(0.0494)	(0.0510)
Geo controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	69	69	77	77	77	76	78	77	80	79	79	78
R-squared	0.724	0.720	0.699	0.711	0.726	0.735	0.775	0.774	0.797	0.787	0.803	0.784

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Panel B: dependent variables are log of per capital GDP (lrgdpch) or log real GDP per worker (logwok)

	1970		1975		1980		1985		1990		1995	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
COEFFICIENT	lrgdpch	logwok	lrgdpch	logwok	lrgdpch	logwok	lrgdpch	logwok	lrgdpch	logwok	lrgdpch	logwok
log of real openness	0.552**	0.707***	0.487***	0.592***	0.764***	0.936***	0.549***	0.603***	0.568***	0.640***	0.505***	0.505***
	(0.223)	(0.261)	(0.122)	(0.146)	(0.217)	(0.284)	(0.108)	(0.130)	(0.108)	(0.118)	(0.140)	(0.169)
polity2	0.0146	0.0104	0.0188	0.0155	0.00435	-0.000379	0.0261*	0.0252	0.00451	0.00284	-0.00152	-0.0129
	(0.0226)	(0.0252)	(0.0153)	(0.0156)	(0.0198)	(0.0224)	(0.0157)	(0.0170)	(0.0129)	(0.0146)	(0.0169)	(0.0174)
log of population	-0.0694	-0.0505	-0.0542	-0.0229	0.0247	0.0815	-0.00690	0.0322	0.0464	0.0854	0.0355	0.0291
	(0.0836)	(0.102)	(0.0750)	(0.0853)	(0.0766)	(0.0984)	(0.0608)	(0.0689)	(0.0557)	(0.0670)	(0.0733)	(0.0823)
conflict	0.0827	0.245	-0.203	-0.182	-0.339	-0.356	-0.247	-0.231	0.153	0.223	-0.0606	-0.0123
	(0.256)	(0.308)	(0.259)	(0.294)	(0.408)	(0.477)	(0.217)	(0.229)	(0.142)	(0.143)	(0.191)	(0.219)
log exchange rate	-0.0211	-0.0215	-0.0161	-0.0181	0.00701	0.00673	0.00227	-0.00641	-0.0673**	-0.0618**	-0.0782***	-0.0809***
	(0.0152)	(0.0169)	(0.0156)	(0.0168)	(0.0240)	(0.0262)	(0.0228)	(0.0243)	(0.0303)	(0.0313)	(0.0289)	(0.0314)
gatt	0.0757	-0.0392	0.0757	-0.0219	0.267	0.225	0.185	0.108	0.402**	0.220	0.454**	0.389*
	(0.252)	(0.291)	(0.198)	(0.214)	(0.258)	(0.307)	(0.191)	(0.204)	(0.192)	(0.201)	(0.177)	(0.200)
neighbours' growth	0.0106	0.0151	0.00103	0.00375	-0.0118	-0.0110	0.00880	0.00482	0.00242	0.00612	-0.00182	0.00171
	(0.0220)	(0.0249)	(0.0170)	(0.0177)	(0.0215)	(0.0282)	(0.0371)	(0.0385)	(0.0103)	(0.0113)	(0.0129)	(0.0133)
log of neighbours' population	-0.00156	0.0142	-0.0479	-0.0509	0.129	0.151	-0.000386	-0.0163	0.0470	0.0251	0.0480	0.0450
	(0.101)	(0.118)	(0.0594)	(0.0672)	(0.101)	(0.118)	(0.0621)	(0.0685)	(0.0464)	(0.0510)	(0.0539)	(0.0546)
FTA	0.318	0.408	-0.0577	0.00659	-0.362	-0.350	-0.0428	-0.0379	-0.0576	-0.116	-0.0535	-0.0376
	(0.223)	(0.256)	(0.381)	(0.390)	(0.303)	(0.309)	(0.259)	(0.244)	(0.110)	(0.115)	(0.0615)	(0.0691)
EIA	0.968	1.818**	0.692	1.181	1.359**	1.485*	0.379	0.387	0.195	0.291	0.151	0.164
	(0.618)	(0.773)	(0.583)	(0.719)	(0.671)	(0.764)	(0.376)	(0.364)	(0.253)	(0.264)	(0.146)	(0.147)
CU	-1.010*	-1.703**	-0.779	-1.212*	-1.035**	-1.071*	-0.563***	-0.494**	-0.345	-0.304	-0.0520	-0.0588
	(0.518)	(0.670)	(0.579)	(0.694)	(0.507)	(0.578)	(0.202)	(0.209)	(0.250)	(0.259)	(0.105)	(0.115)
bfta	0.280**	0.277**	0.107	0.113	0.0106	0.0195	0.0145	0.0863	-0.00627	-0.00515	0.0351	0.0373
	(0.111)	(0.119)	(0.161)	(0.169)	(0.197)	(0.215)	(0.113)	(0.112)	(0.0597)	(0.0658)	(0.0247)	(0.0286)
beia	-0.649*	-1.046**	-0.197	-0.475	-0.190	-0.355	-0.175	-0.343	0.0553	0.0351	-0.00845	-0.0116
	(0.371)	(0.447)	(0.410)	(0.452)	(0.416)	(0.476)	(0.273)	(0.274)	(0.0923)	(0.0945)	(0.0703)	(0.0735)
bcu	0.293	0.568*	0.220	0.395	0.413	0.478	0.198	0.209	-0.0316	-0.0163	-0.0332	-0.0464
	(0.278)	(0.338)	(0.298)	(0.342)	(0.293)	(0.348)	(0.184)	(0.194)	(0.0644)	(0.0659)	(0.0487)	(0.0489)
Geo controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	69	69	77	77	77	76	78	77	80	79	79	78
R-squared	0.597	0.567	0.625	0.624	0.460	0.390	0.701	0.704	0.795	0.786	0.805	0.789

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10
Panel-FE IV estimation allowing for individual-specific coefficients on openness

Dependent variable is detrended real GDP per capita (d_y) or detrended real GDP per worker (d_wok)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent	d_y	d_y	d_y	d_y	d_y	d_y	d_wok	d_wok	d_wok	d_wok	d_wok	d_wok
log of nominal openness	0.104***		0.0875**		0.0813**		0.120***		0.104***		0.0964***	
	(0.0348)		(0.0348)		(0.0352)		(0.0313)		(0.0305)		(0.0305)	
log of real openness		0.0834***		0.0741***		0.0687**		0.0966***		0.0880***		0.0812***
		(0.0259)		(0.0274)		(0.0276)		(0.0237)		(0.0242)		(0.0240)
log of nominal exchange rate			-0.0148***	-0.0108*	-0.0157***	-0.0118*			-0.0158***	-0.0110	-0.0168***	-0.0121*
			(0.00510)	(0.00640)	(0.00514)	(0.00623)			(0.00522)	(0.00669)	(0.00524)	(0.00642)
neighbours' growth			0.000351	0.000376	0.000465	0.000489			0.000508	0.000542	0.000652	0.000685
			(0.000917)	(0.000919)	(0.000925)	(0.000923)			(0.000772)	(0.000770)	(0.000778)	(0.000771)
log of neighbours' population			-0.0583	-0.0500	-0.0601	-0.0517			-0.0259	-0.0161	-0.0273	-0.0175
			(0.151)	(0.152)	(0.143)	(0.143)			(0.150)	(0.151)	(0.141)	(0.141)
polity2					-0.00263	-0.00283					-0.00336*	-0.00359*
					(0.00184)	(0.00196)					(0.00184)	(0.00200)
Observations	580	580	580	580	575	575	577	577	577	577	572	572
R-squared	0.141	0.090	0.163	0.113	0.176	0.131	0.175	0.115	0.201	0.139	0.221	0.167

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: all variables are detrended on (t, world openness at time t)

Table 11									
Robustness check: cross section and panel estimates									
Dependent is log of real GDP per capita									
	Land borders only					Contiguity up to 540 miles			
	(1) CS	(2) CS	(3) Panel FE	(4) Panel FE		(5) CS	(6) CS	(7) Panel FE	(8) Panel FE
log of nominal openness	0.289*		0.228***			0.345**		0.275***	
	(0.151)		(0.0563)			(0.147)		(0.0670)	
log of real openness		0.304**		0.209***			0.351***		0.265**
		(0.131)		(0.0793)			(0.115)		(0.119)
polity2	-0.0197	-0.0157	-0.00463	-0.00328		-0.00744	-0.000323	-0.00669	-0.00743
	(0.0143)	(0.0141)	(0.00391)	(0.00419)		(0.0129)	(0.0127)	(0.00407)	(0.00463)
log of population	0.0479	0.0328	-0.617***	-0.637***		0.0681	0.0697	-0.673***	-0.688***
	(0.0689)	(0.0677)	(0.179)	(0.188)		(0.0601)	(0.0585)	(0.190)	(0.217)
conflict	-0.285	-0.267	-0.0722**	-0.0493		-0.324	-0.302	-0.0529*	-0.0289
	(0.174)	(0.189)	(0.0294)	(0.0392)		(0.209)	(0.235)	(0.0287)	(0.0436)
log exchange rate	-0.0778***	-0.0937***	-0.0185***	-0.0115*		-0.0756***	-0.0872***	-0.0233***	-0.0152**
	(0.0264)	(0.0305)	(0.00633)	(0.00655)		(0.0232)	(0.0261)	(0.00574)	(0.00690)
price level relative to US	0.0112**		-0.000512			0.0109***		-0.000632*	
	(0.00547)		(0.000352)			(0.00305)		(0.000370)	
gatt	0.537***	0.553***	0.0359	0.0402		0.460***	0.478***	-0.00750	-0.00494
	(0.188)	(0.190)	(0.0527)	(0.0538)		(0.155)	(0.155)	(0.0476)	(0.0520)
Neighbors controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
PTAs	YES	YES	YES	YES	YES	YES	YES	YES	YES
Geo controls	YES	YES				YES	YES		
Observations	75	75	463	463		92	92	570	570
R-squared	0.830	0.826	0.453	0.294		0.822	0.813	0.459	0.254
Number of ccode			72	72				90	90
Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1									
Underidentification LM (Paap)	3.401	5.271	7.002	3.186		6.175	8.887	7.826	2.798
Weak ID test (Kleibergeen-Paap F)	11.507	22.454	94.938	7.366		18.278	25.066	48.323	5.657