TRANSNATIONAL SOCIAL NETWORKS AND GLOBALIZATION: THE GEOGRAPHY OF CALIFORNIA’S EXPORTS

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Transnational Social Networks and Globalization: The Geography of California's Exports

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The work is also reported in two publications of the California Policy Seminar:

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All errors are our very own.
Transnational Social Networks and Globalization: The Geography of California’s Exports

Abstract

The paper develops a modified gravity model of California’s exports. The export levels are stipulated as being dependent on the importing country’s GDP, distance from California, GDP per capita and degree of openness to foreign trade. We also include a transnational social network variable - the number of first generation immigrants from the importing country resident in California, which turns out to be a significant determinant of the state’s exports to over 180 countries. Perhaps more significantly, the inclusion of the immigrant factor reduces the importance of distance, which proxies for transportation costs. Indeed, in the era of globalization, these transnational immigrant networks are a new source of comparative advantage for countries with relatively open borders. Results for the state of New York are also similar, with the immigrant variable being somewhat smaller in terms of its impact. Both the states show a Pacific-Rim bias, with California exporting more than 3 times as much to the region as would have been the case, given the GDPs, distance etc. of the importing countries in the region.
Transnational Social Networks and Globalization: The Geography of California’s Exports

Introduction
Increasing foreign trade and cross-border investments are now well-known attributes of the modern global economy, with both the US as well as California being active participants in this trend. The marketplace is understood as being worldwide, production location as a transitory phenomenon, and global competitiveness a concept that informs policy down to the regional/sub-national level. It is in this context of ever-increasing global economic integration, regional trading blocks, currency unions and other economic phenomena that the issue of foreign trade and its impact on industrial structure, employment, wages and living standards has assumed particularly acute dimensions.

In recent decades, some of the most spectacular growth rates of GNP have been achieved by countries that have fully utilized the potential of the global marketplace with its billions of consumers, its severely demanding competitiveness and its promise of unmatched growth. Trade, or more accurately exports, are sometimes seen, rightly or wrongly, as engines of growth and as panaceas for anemic economies. Indeed, one of the significant features of California's economic recovery after the last recession has been the remarkable growth in its exports. A number of recent studies dealing with the global component of California's economy have emphasized the export-led character of growth, particularly in the high-tech sectors1. An additional factor in the increasing attention paid to trade issues is that the biggest export markets of the US have been showing rapid growth.

Among the various factors accounting for the growing importance of foreign trade in California’s economy are its location, the composition and structure of its economy, and the diverse population with its many, still fresh ties to the countries of origin.

There are two aspects of California’s location that contribute to increased openness of its economy. Firstly, is California’s prime location on the Pacific-Rim. As an integral part of the fastest growing region in the world it is an enthusiastic participant in its dynamic trade flows. The increasing activity

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1 See Kroll, Bardhan and Jaffee, 1995.
and importance of the Asia-Pacific Economic Cooperation forum, which brings together 18 countries of the fastest growing region of the world with a view to create a free trade zone, establishes an economic and geographic context that is conducive to increased trade and welfare. Secondly, the state is located strategically on the trade route between the largest economy in the world, the US, and the most dynamic region. It therefore serves as a transportation hub and conduit for the trade of the rest of the US with Asia, which is now the fastest growing market for US goods and services.

The study of a region’s exports can be carried out either from the point of view of its competitiveness, i.e. supply-side issues, like costs, productivity, innovation etc., or from the viewpoint of demand-side issues, i.e. the characteristics of importing countries. While the cost structure, industrial composition and innovation are key characteristics of the state economy and affect its competitiveness and therefore its trade flows, they are not the focus of our study here. In this paper we look at the characteristics of various countries vis-à-vis California in order to create a trade geography of California’s exports. We analyze the features of importing countries’ economies, their location in relation to California and their predisposition toward trade in general, in order to arrive at an explanatory picture for California’s exports from the “other side”.

In describing the attributes of the importing countries we also include in our model, perhaps for the first time, the impact of first generation immigrants from those countries, settled in the state of California, on the exports of the state to their country of origin. We thus incorporate another aspect of the enormous knowledge and expertise that foreign immigrants bring – their knowledge about their own countries.

**Objective**

We address the following questions:-

- How do first generation immigrants to California impact trade with their home countries and is there any quantitative relationship between number of foreign-born in California and California’s exports to their home countries?
- Who are California’s trading partners and why do we trade with them?
- What is the trade geography of California, i.e. what causes the spatial distribution of California’s exports?
♦ Does distance from an importing country matter for California’s exports, and under what conditions is distance not relevant as an explanatory factor?

♦ Is distance a good proxy for transportation costs for California’s exports?

♦ Are there any “most favored trading partners” of California? Is there a bias toward exports to Asia, or Europe?

♦ Is California different from RUSA (Rest of the US), and from other states in terms of its trade geography? And if so, why?

The Basic Gravity Model
The tool most commonly used to look at spatial and geographic characteristics of trade has been the gravity model. The gravity model is an import from the natural sciences, an adaptation from the physics of gravitation between two masses, hence the name. Stewart (1941) was among the earliest adaptors of the gravity model to a social science context, although some might credit Young (1924) or even Carey (1858) as the original innovator. In the field of international trade, Tinbergen (1962) and Poyhonen (1963) independently used the model to estimate trade flow relationships.

In all of the above cases (except perhaps for Carey), the gravity model was criticized for lacking a solid theoretic foundation. Nevertheless, the model’s appeal has endured in international economics because it fits the data remarkably well and lends itself very easily to interesting extensions and adaptations, a feature that we exploit in this paper.

The no-frills economic version of the gravity model postulates that trade between two countries is proportional to the product of their gross domestic outputs, and inversely related to the square of the distance between them.² The reasoning behind it is that, on the one hand, an increase in GDP implies an increase in aggregate demand, part of which at least, will fall on foreign goods. On the other hand, due to transportation costs, the further away a country is from its trading partners, the less it will trade with them. The model is fully capable of reflecting such empirical regularities as the tendency for industrialized countries to trade with one another and the propensity of larger countries to be less open to international trade than smaller countries. The model has been used to study the development of natural trading blocks, trade affinities of various countries, trade diversion versus trade creation issues,
as well as for gauging the impact of income differences between countries on trade and vice-versa (See Teresa Cyrus 1996). It has recently returned in various forms, linked with the increasing interest in regional trading patterns and trade forecasting.

We will be among the first to use the gravity model to analyze the foreign trade patterns of a constituent region of a nation-state (i.e. a state of the US). A traditional gravity model uses bilateral data, as well as both exports and imports of an entire set of countries, in order to arrive at general determinants that could be applicable to the entire group. However, due to data limitations explained below, as well as due to the fact that our focus is the state of California, we will be looking solely at the exports of California and its determinants, expressed in the form of characteristics of its trading partners. Our model is perhaps more like a “hub and spoke” version of the gravity model: we don’t model trade occurring between California’s trading partners. Thus in our basic version of the model, we hypothesize that California’s exports are proportional to the GDP of the importing country, and inversely proportional to the distance between them:

\[ x_{ci} = \alpha + \beta y_i + \gamma d_{ci} \]  \hspace{1cm} (1) \]

Here, \(x_{ci}\) is the log of California’s exports to country \(i\), \(y_i\) is the log of that country’s GDP, \(d_{ci}\) is the log of the distance between California and country \(i\), and \(\alpha, \beta\) and \(\gamma\) are constants to be determined through statistical regressions, with the latter expected to be negative. We also use a number of control variables, such as GDP per capita, and some measure of openness of the economy. The intuition is that the higher the per capita GDP of the importing country, the more it will import from California, i.e. richer countries import more from California, everything else being equal. Openness is usually understood as the ratio of the sum of exports and imports of a country to its GDP. Obviously, the more open a country generally, the more it will import from California as well. Of course, there could be a collinearity problem between openness and GDP per capita, since richer countries generally tend to be more open, although one could hypothesize that GDP per capita can still be included because a richer country may trade more with a rich region like California. This insight is due to recent advances in the theory of international trade. Whereas earlier the assumption was that unlike countries would trade with each other because of their different factor endowments, and hence different comparative

\[2\text{ See Deardorff (1984) and Sen and Smith (1995).}\]
advantage, it has been observed that in actual fact like countries trade with each other due to a large proportion of intra-industry trade.

**Incorporating Immigrant Networks in the Model**

The role of immigrants, particularly first generation immigrants, in the US and California economies, and their impact on labor demand, wages, welfare issues, job creation, business formation etc. have been fairly widely studied\(^3\). Their impact, however, on issues of international trade, or more generally, the study of cross-border immigrant networks and ties in an applied economic sense, has mostly been in the domain of conjecture and anecdotal evidence. Sociologists, on the other hand have been studying cross-border networks and their creation and maintenance, for some time. Linda Matthei (1996) describes a gendered network building process whereby migrant and nonmigrant women develop ties that link remittance sending and receiving societies. Christine Ho (1993) studies the creation of “international families” of Caribbean immigrants and their operation as networks. There are studies on the cards for examining how networks of Asian engineers in Silicon valley maintain and develop contacts with their home countries (Saxenian, forthcoming). On the quantitative, economic side, Gould (1996) has been perhaps the only author who has attempted to measure the effect of cross-border immigrant networks on economic variables, including trade.

The contention here, is that there are a number of reasons why immigrants can impact trade and investment flows. Firstly, there could be a home-country preference for certain goods, as well as knowledge, tradition and bias working in their favor. Of course, this pertains mostly to fresh immigrants with a “product memory”. Secondly, the networks of contacts, relatives etc. in the home country result in lowered costs of doing business there. (Incidentally, both in the US and in the country

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\(^3\) “Continual entry of new blood, new energy, is key to the success of the Californian economic dynamo...” ("Rise of innovative hotspots...", International Marketing Review, n3,93). The Center for the New West studies the propensity of new immigrants to start small businesses. Julian Simon in a series of articles and books contends that immigration results in net job creation,... wages appear to be somewhat depressed initially but unemployment does not rise even when lags are taken into account. (Julian Simon, "Immigrants and Alien Workers", in "Journal of Labor Research", n13,n1,1992). Kroll and Kirschenbaum in an accompanying paper report the large proportion of foreign born in the computer industry.
of origin, the recent immigrants are instrumental in propagating new products. In the US, their preference for home country goods results both in their demand being satisfied, as well as introduction of new goods for the US consumer at large, thus increasing the product variety available. In the country of origin, they are similarly responsible for introducing popular American products. Thirdly, as we discover in our study, the transnational networks of immigrants ameliorate the effect of distance in our empirical studies, under some circumstances. We interpret this to suggest that since recent immigrants visit their country of origin and maintain contacts in other ways, that fixed cost is spread over business purposes as well, thus diminishing the 'distant country” effect.

Our basic extended model incorporating immigrant networks now has the form:

\[ x_{ci} = \alpha + \beta y_i + \gamma d_{ci} + \mu f_{ci} \]  \hspace{1cm} (2) \]

where \( f_{ci} \) is the log of first generation immigrants from country \( i \) resident in California.\(^4\)

Data

We compiled a very large database on California exports (New York as well), GDP, GDP per capita of every available country in the world that California trades with, degree of openness of the economies of these countries, the distance in kilometers from California (New York), and the number of foreign-born in these two states.

California Exports

Until recently no trade data was available for US states. Since both exports and imports are identified and measured at the border, or more accurately, the customs crossing, the coastal states get more trade attributed to them than they are responsible for. The solution therefore, is to separate the customs data into two streams – the trade of the state where the customs district is situated, and the trade of the hinterland states. Beginning in 1987 the Massachusetts Institute of Social and Economic Research (MISER), together with the California World Trade Commission have brought out California export data by 2 digit aggregated SIC codes, as well as by country of destination, on the basis of the raw data

\(^4\) First generation immigrants are also termed foreign born residents.
collected by the Department of Commerce on manufacturers’ “origin of movement” documents. As yet, no data on state-wise imports are available. Jaffee’s paper (Chapter 2) however, does suggest a few approaches to developing some data imputation techniques for California’s imports.

GDP, GDP per Capita, Openness
There are a number of sources for GDP and GDP per capita, including the World Bank, Penn World Tables, OECD etc. We obtained the openness indicators through the NBER.

Distance
The distance used has been the great circle distance between approximately the west-central region of California and usually, the largest city of the other country, with some exceptions. In countries that cover large geographic areas, such as Russia, India, Australia, and China we took into account the geographic spread of economic activity. By either measure, our results do not change in any significant manner. More importantly, the great circle distance is admittedly a poor measure of actual shipping distance, and hence an even poorer proxy for transportation costs. We are in the process of developing our own set of actual shipping costs, as well as distances from the LA-Long Beach/LAX area, with an add-on fixture of port costs around the world. In future work we shall be using both – an explicit measure of transportation costs, as well as refined measures of distance in case the former are unobtainable.

Foreign-Born or First Generation Immigrants
The “Social and Economic Characteristics” series of the US Census 1990 in its United States Summary Table 144 publishes numbers of foreign-born residents in the US by each state of the Union. The sample size of countries is quite extensive. In the case of a number of newly formed countries, such as the successor states to the Soviet Union and Yugoslavia, we have allocated to the successor states their share of foreign-born in the same proportion as their population share in the former Soviet Union or Yugoslavia.

Estimates for the Basic Equation

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5 For data issues please refer to Dwight Jaffee’s paper in this report.
6 We used Microsoft’s Encarta software for the purpose.
We estimate a pooled, time-series cross sectional regression on our eq.1). The cross sectional part is over a set of close to 190 countries, and the time-series part is over the 4 years 1990-1993. We initially start off with the simplest possible specification expressed in equation 1), and gradually add the control variables. The base model estimates are as follows:

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha$ (Constant)</td>
</tr>
<tr>
<td>$\beta$(GDP)</td>
</tr>
<tr>
<td>$\gamma$(Distance)</td>
</tr>
</tbody>
</table>

Adjusted $R^2 = 0.75$, t-statistics in parentheses at right

The signs of the coefficients are as expected. The magnitude of both the coefficients is somewhat larger than what is found in other studies on entire countries, including the US, but as we shall see, the specification is, as yet incomplete. A country that is situated at a distance twice as far as another, is likely to import 3 times less from California, everything else being equal. The elasticity on the GDP variable is also more than one, suggesting that 1% increase in GDP of a representative country results in an increase of more than 1% of imports from California.

We now add our two main control variables and re-estimate the equation:

<table>
<thead>
<tr>
<th>Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>GDP</td>
</tr>
<tr>
<td>Distance</td>
</tr>
<tr>
<td>GDP per capita</td>
</tr>
<tr>
<td>Openness</td>
</tr>
</tbody>
</table>

Adjusted $R^2 = 0.81$, t-statistics in parentheses at right

The measure of openness turns out to be statistically significant, but the GDP per capita is not. As we mentioned earlier, the former might be capturing the effect of the latter rendering it redundant in the above specification.
Impact of Immigrant Networks

In order to complete the specification we now expand our model from its basic structure in order to accommodate the effect of immigrant networks. The variable used here is the log of foreign-born, by country of birth, and resident in California.

<table>
<thead>
<tr>
<th>Table 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>GDP</td>
</tr>
<tr>
<td>Distance</td>
</tr>
<tr>
<td>GDP per capita</td>
</tr>
<tr>
<td>Openness</td>
</tr>
<tr>
<td>Foreign-Born in CA</td>
</tr>
</tbody>
</table>

Adjusted $R^2 = 0.82$, t-stats in parentheses at right

There are two interesting things about this latest result. Firstly, the GDP per capita coefficient is now significant, after the introduction of the foreign-born variable. Earlier our data did not show, in a statistically significant manner, that the richer a country the more it imported from California. In other words, it implies that since quite a few of the first generation immigrants in California are from relatively poorer countries, the exports to those countries are now accounted for by the network effect explained below. The remainder, i.e. the exports to richer countries, so to speak, now fits in with the expected pattern of trade.

Secondly, and unexpectedly, the coefficient on the distance variable sees a dramatic decline. From over 1.7 and 1.88, it has now gone down to 0.56, retaining the appropriate negative sign. In this specification, all the variables turn out to be statistically significant. The most interesting one though, is the latest addition to our set of explanatory variables – the logarithm of number of foreign-born in California by country of origin. The sign on the coefficient is positive and significant, implying that for every 1% increase in number of first generation immigrants from a given country, the exports from California go up by nearly ½ a percentage point.

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7 We plan to run various instruments for GDP per capita.
Significantly, it is the introduction of this explanatory variable that accounts for the decline in both the magnitude and significance of the distance variable. Since the foreign-born variable is robust to changes in specification (as are, incidentally, the GDP and openness variables), and the distance variable is not when the former is included, the result is open to an interesting interpretation. It is possible that the two variables are very highly negatively correlated, i.e. most of the immigration to California is from countries located nearby, in relative terms. We check for that and find that although there is negative correlation it is not significant statistically. Our interpretation of this result is that once the transnational networks of first generation immigrants are in place, distance, or in other words, transportation cost, ceases to matter as much. The mechanism through which this result operates evidently has to do with reduction in trading costs, brought about by the networks, through the medium of existing contacts, stock of knowledge and information on the marketplace. Significantly, the latter is independent of distance. Indeed, whether a group of foreign-born immigrants have a well-established set of contacts, potential buyers etc. in their country of origin, or not, has little to do with that country's distance from California. Also, the marginal costs involved in creating the trade infrastructure are much lower, and again, may only partially depend on distance, since the cost of travel, in order to establish new contacts, is spread over existing traveling costs. In other words, the fixed costs incurred by immigrants in their frequent travels to their country of origin, are spread to cover business purposes as well.

We hasten to state that this extraordinary result needs to be qualified. Since it is possible that the migration from Mexico and a few other countries could be accounting for most of the effect, we run the regression again with a dummy variable for the border states of the US - Mexico and Canada. The result is statistically insignificant. However, as discussed below, a further check with other regional dummies does suggest that the phenomenon of vanishing transportation costs is related to a rather large important trading block, of crucial significance for California.

Most Favored Trading Partners, or Does California’s Exports Exhibit a Bias Toward Any Region?
The advantage of using a gravity model is the facility with which geographical trade biases can be extracted out of the data. The standard way to do this would be to use dummies for countries
belonging to major regional blocks, such as the Asia-Pacific Rim countries, countries of Western Europe, NAFTA etc. Similar to the Mexico, Canada dummies, the West European dummy turns out to be statistically insignificant. Interestingly, the latter has a negative sign in the estimates, suggesting that California trades less with West Europe than would be the case given the GDPs of those countries, distance etc. In our future work involving better measures of distance, or explicit measures of transportation costs, we expect to shed some more light on this result. Our tentative conclusion here, is that although the average distance form California to the West European bloc and the Asian countries is not dissimilar, it is a known fact that shipping (by sea) to Europe takes significantly longer. It is the Asia dummy alone that is statistically significant and positive in sign. We now present our final “complete” specification, with all variables having significant coefficients:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-stat</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>1.02 (17.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td>-1.17 (12.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP per capita</td>
<td>0.15 (2.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>0.81 (6.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign-Born in CA</td>
<td>0.30 (6.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia-Dummy</td>
<td>1.32 (8.9)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adjusted R² = 0.85, t-stats in parentheses at right

While most of the variables have now settled into a steady and robust phase, the introduction of the Asia dummy has created its own share of surprises. To begin with, the latter has a positive sign and is significant. The interpretation of the magnitude of the coefficient is as follows:

The exponential of 1.32, i.e. e^{1.32} = 3.74, i.e. California’s exports are 274% higher to the Asian countries. In other words, a country’s belonging to the Asia-Pacific region raises its imports from California by nearly 4 times, everything else being equal.

The other surprise is that the distance variable is now back in contention. It seems that it was the Asia-Pacific region, which had created the anomaly of vanishing transportation costs. Once the latter region

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8 The set of countries does not necessarily completely coincide with the Asia Pacific Economic Cooperation bloc, or the European Community.
9 The constant is insignificant and vanishingly small. We also check for fixed effects in our pooled regression. The constant shows a steady decline over the period 1990-1993.
has been taken into account, for the rest of the world one does get the expected result that a further away a country the less it imports from California.

Also, although the foreign-born coefficient has gone down in magnitude, it is still considerable and significant. Evidently, it is not just the Asian networks that are effective conduits of trade between California and their countries of origin. People from other regions of the world, settled in the state, have been nearly as significant in generating trade with their country of origin.

**Comparison with New York State, or, How Different is California**

In order to assess the significant characteristics of California’s exports, we try and estimate a similar equation for the state of New York. The exports of the state to various countries have been acquired from the New York Trade Commission, and perhaps have the same provenance as the California data, although for New York we have data for 3 years and not 4. The distance has been calculated by the same method, in this case from the city of New York, and the foreign born data is from the same Table 144 of the US Census Bureau. The rest of the variables are the same. Table 5 includes a summary of the relevant data for both California and NY:

<table>
<thead>
<tr>
<th></th>
<th>California</th>
<th>New York</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Distance</td>
<td>10500 kms</td>
<td>8500 km.</td>
</tr>
<tr>
<td>from 180 countries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Foreign-Born</td>
<td>6,458,825</td>
<td>2,851,861</td>
</tr>
<tr>
<td>Exports 1994</td>
<td>$81.1 bill</td>
<td>$33.5 bill.</td>
</tr>
<tr>
<td>Exports 1995</td>
<td>$96.5 bill</td>
<td>$37 bill.</td>
</tr>
<tr>
<td>Exports 1996</td>
<td>$104.4 bill</td>
<td>$38.7 bill.</td>
</tr>
</tbody>
</table>

The results of the estimation for New York are shown in Table 6, which also includes the results from Table 4 for easy comparison:

<table>
<thead>
<tr>
<th></th>
<th>Dependent Variable: Log California Exports</th>
<th>Log NY Exports</th>
</tr>
</thead>
</table>

---

10 **Note:** The regression is in natural logs.

11 **As the table shows California is a much bigger exporter, in spite of being on an average 2000 km. Further away**
<table>
<thead>
<tr>
<th>Variable</th>
<th>New York</th>
<th>California</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>1.02 (17.1)</td>
<td>0.95 (15.0)</td>
</tr>
<tr>
<td>Distance</td>
<td>-1.17 (12.8)</td>
<td>-0.73 (3.9)</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>0.15 (2.2)</td>
<td>0.028 (0.3)</td>
</tr>
<tr>
<td>Openness</td>
<td>0.81 (6.0)</td>
<td>0.34 (2.2)</td>
</tr>
<tr>
<td>Foreign-Born</td>
<td>0.30 (6.5)</td>
<td>0.24 (4.2)</td>
</tr>
<tr>
<td>Asia-Dummy</td>
<td>1.32 (8.9)</td>
<td>0.6 (3.0)</td>
</tr>
</tbody>
</table>

Adjusted $R^2 = 0.85$, Adjusted $R^2 = 0.80$

The foreign-born network variable is significant for the state of New York as well, although the magnitude is slightly smaller. The same holds true for the Asia dummy, which implies New York exports to Asia-Pacific region are 82% higher than would normally be the case. The surprise is that distance seems to matter less for New York vis-à-vis California, once the Asian factor is accounted for, although this specification is perhaps not the correct one for New York and we need to check with other regional dummies.

We find that for New York, the GDP per capita variable is insignificant under any specification. After eliminating it from our model and checking for a number of regional dummies, we present below what could perhaps be termed the “true” model of the state of New York’s exports, corresponding to Table 4 for the state of California:

**TABLE 7 (New York)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>New York</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>1.02 (22.0)</td>
</tr>
<tr>
<td>Distance</td>
<td>-0.96 (9.5)</td>
</tr>
<tr>
<td>Openness</td>
<td>0.41 (3.1)</td>
</tr>
<tr>
<td>Foreign-Born in NY</td>
<td>0.19 (3.9)</td>
</tr>
<tr>
<td>Asia-Dummy</td>
<td>0.58 (3.2)</td>
</tr>
<tr>
<td>Euro-Dummy</td>
<td>-0.37 (1.9)</td>
</tr>
</tbody>
</table>

Adjusted $R^2 = 0.83$

The GDP and the distance variables are now very close to the values for California – no surprises there. As mentioned earlier, the foreign-born is still significant and less in magnitude than for California, as is the case with the Asia dummy. Also, as with California the Europe dummy has a negative sign, but in this case it is close to being statistically significant. Indeed, it seems to suggest that New York trades from the rest of the world.
30% less with Europe than it should, in spite of being on the East coast and not having to contend with the Panama canal effect. Both the coasts seem to have an affinity for exports to the booming markets of the Asia-Pacific region. In other words, the US as a whole seems to belong very much to the Asia-Pacific region in trade terms, and the West coast even more so.

Conclusions
* In the era of increasing global economic integration, or globalization of national and sub-national economies, an immigrant country has an additional source of competitiveness -- its resident immigrants from other countries. Transnational networks of first generation immigrants settled in California are a significant factor in California exports to their country of origin. There is a 0.3 to 0.5% increase in exports for each 1% increase in first generation immigrants.
* Everything else being equal California exports nearly three times as much to a country in the Asia-Pacific region, as it does to any other country in a different part of the world.
* The richer a country the more it imports from California.
* As far as the Asia-Pacific region is concerned, distance and transportation costs are not an inhibiting factor in trade.
* Exports to Mexico and Canada are not unusually high, in spite of NAFTA and their adjacency.
* California is, on an average, 2000 kms. further away from the rest of the world than the state of New York.
* New York exports some 80% more to Asia and 30% less to Europe than it should given the parameters of our model. The networks of foreign-born play the same role in NY as they do in California, but for a different set of countries. While in California the primary effect is through Asian immigration, in NY it is not concentrated in any region. The magnitude of the effect is less in New York.
* The gravity model fits the data very well, and can be used to analyze state level trade flows.

Further Research
While the gravity model has been robust in its results, a number of issues have been raised that we shall address in further work:

1) The actual test of how well the immigrant networks explain trade flows will be usage of time-series data on foreign-born, i.e. looking at 1980 data and looking at impact of change in immigration on
change in state exports, by applying a time-differenced gravity model. In addition, we will be refining our measure of foreign-born data by also including education and occupation. We would also like to extend our study to other immigrant countries, such as Australia and Canada, and examine migration and trade flows in the entire Asia-Pacific region.

2) We will be incorporating a better measure of distance, and we shall attempt to develop an explicit measure of transportation costs. (See Postscript below.)

3) We will be doing similar estimates for the Rest of the US (RUSA).

4) We need to carry out similar estimates for the state of Illinois—a non-coastal state, to get a proper assessment of how being a coastal state matters.

5) We shall also be experimenting with different equation specifications, particularly for the distance variable and other variables, to account for non-linearities and other issues.

POSTSCRIPT

Our data for California’s exports, provided by the California Trade & Commerce Agency, has been made available to us in three forms: 1) Total exports (by country and by 2 digit SIC code), and then the same Total exports are subdivided into 2) Total exports by air, and 3) Total exports by surface transportation (includes both sea and land modes of transportation). Apart from exports to Canada and Mexico, where a substantial part of the exports are by land transportation, exports to the other countries are by air and sea modes of transportation. Since the gravity model traditionally uses distance as a proxy for transportation costs, we decided to run the basic regression for California, separately for the state’s exports by air transportation and sea transportation, in order to evaluate the impact different modes of transportation have on the level of exports.

Dependent Variable: Log of California’s exports by Air.

Table 8

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Constant</strong></td>
<td><strong>-6.9 (3.6)</strong></td>
</tr>
</tbody>
</table>
GDP  
Distance  
GDP per capita  
Openness  
Foreign-Born in CA  
Asia-Dummy  

Adjusted $R^2 = 0.86$, t-stats in parentheses at right

Dependent Variable: Log of California’ exports by Surface Transportation.

<p>| | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Table 9</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>3.2 (1.5)</td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>0.92 (13.9)</td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td>-1.37 (5.6)</td>
<td></td>
</tr>
<tr>
<td>GDP per capita</td>
<td>0.09 (1.2)</td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>0.52 (3.7)</td>
<td></td>
</tr>
<tr>
<td>Foreign-Born in CA</td>
<td>0.37 (6.3)</td>
<td></td>
</tr>
<tr>
<td>Asia-Dummy</td>
<td>1.3 (7.8)</td>
<td></td>
</tr>
</tbody>
</table>

Adjusted $R^2 = 0.82$, t-stats in parentheses at right

The coefficient on the distance variable is significantly different for the two kinds of exports. In terms of exports by air, it implies that everything else being equal, if a country is twice the distance from California, it imports about 50% less; whereas for exports by sea the drop is closer to 80%$^{12}$.  

California exports are increasingly by air, thus mitigating the adverse impact of distances and transportation costs on trade. In 1993, 52% of the state’s exports were transported by air, and the figure crossed 60% in 1996. Most of the state’s high tech goods, which form an increasing proportion of the state’s trade basket are transported by air, both because their value to weight ratio is high, and also because of the innovative dynamism that puts a high premium on quick deliveries and supplies. It is this additional combination of factors that further strengthens the state’s competitiveness. In one of the proposed extensions to this paper we intend to disaggregate the exports further and look at some key 2 digit sectors, such as computers & industrial machinery, electronic components, instrumentation and others.
$\exp(-.71) = 0.49$, i.e. = 1-0.51; $\exp(-1.51) = 0.22 = 1-0.78$
Bibliography


