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Diversification and Specialization of U.S. States[*]

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Abstract

This paper documents the evolution of the international relationships of individual U.S. states along three dimensions: trade, migration, and finance. We examine how specialized or diversified state economies differ in terms of the products they export and with whom they trade, the origins of the immigrants who live in the state, and the origins of the foreign banks operating in the state. We show that states that are diversified along one of these dimensions are often quite specialized along others. New York is–perhaps, not surprisingly–the most diversified state in terms of global linkages.

JEL codes: F10, F16, F22, F30, G21

1 Introduction

The tremendous growth of international trade over the past several decades has led to greater economic integration. World trade, composed of both nominal imports and exports, increased dramatically from about \$100 billion in 1950 to over \$37 trillion in 2014. As a result of the increased trade flows, consumers around the world enjoy a broader selection of products. However, while increased international trade has spurred economic growth across the globe, the increased interconnectedness means that the effects of economic slowdowns are also spread across geographical boundaries.

Focusing on just the United States, the growth of U.S. merchandise exports over the past two decades has been remarkable. From about \$393 billion in 1990 to over \$1.6 trillion in 2014, exports as a share of GDP have increased from 6.6 percent to 9.3 percent. At the level of individual states, Texas exports more goods than any other U.S. state, accounting for about a fifth of total U.S. exports in 2014. Texas's exports in 2014 totaled \$288 billion, up 2.9 percent from 2013. From 2000 to 2014, Texas' real exports increased at an annual average rate of about 7 percent, faster than the nation's annual average rate of increase of 4 percent. Some of these exported goods are manufactured in the state, while others are produced in other states and shipped to Texas for consolidation in distribution centers and export to destination countries.[1] Though these goods are not produced in Texas, they have positive spillover effects on the state's economy in such areas as warehousing and transportation, generating income and jobs to the regional economy.

Texas exports goods to over 180 foreign destinations. The state's largest trading partner is Mexico, which accounted for about 36 percent of all Texas exports in 2014. Canada is a distant second at 11 percent. Although Mexico remains the state's largest export market, it is receiving a lesser share of the state's nominal exports than it did at the turn of twenty-first century. Texas's export share to Mexico declined from a peak of 46 percent in 2000 to 32 percent during the world trade collapse in 2008. Exports have since gradually rebounded,

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[1] Origin of movement export series state where the export journey begins, reflecting the transportation origin of exports. Reference http://www.census.gov/foreign-trade/aip/elom.html

with shares inching up to 36 percent in 2014, but still 10 percentage points below its peak. Conversely, export shares to other emerging markets such as China and Brazil have increased. Exports to China increased 17 percent on average in 2000-14, while those to Brazil expanded at an average annual rate of about 14 percent during that period. Emerging markets' demand for petroleum and coal products has boosted Texas exports.

The state's largest exports are petroleum and coal products, which represent 19 percent of total state exports, computers and electronics (17 percent) and chemicals (16 percent). The composition of Texas exports has changed over time. The state diversified its economy away from oil and gas, following the oil price collapse and recession in the 1980s. By 2000, computers and electronics accounted for 29 percent of Texas exports and petroleum and coal products had fallen to 4 percent. Since then, as a result of technological innovations in exploration and rising oil prices, the energy sector reemerged as a major driver of growth.

In what follows, we address the following question: How diversified are the international trade linkages of Texas and other states? We approach this question from two angles. First, to what extent are Texas exports driven by exports to a particular country? Given Texas' proximity to Mexico, we might expect that exports to Mexico are particularly important in overall Texas exports. Dependence on a few export partners and products can make exports and exporting states sensitive to developments in the recipient countries. Ideally, a state would export to a range of countries, with shares of trade roughly proportional to the importance of these countries in global economic activity. Likewise, Texas is often stereotyped as being overly dependent on a single sector – oil and gas – as a driver of growth and exports. Being overly dependent on a few sectors leaves a state vulnerable to shocks to those sectors. A preferable arrangement would be to have the composition of exports roughly match the composition of economic activity in the state.

We construct a number of simple measures of the degree to which the exports of Texas and other U.S. states are specialized or diversified by destination and by product. Importantly, we go beyond trade linkages to also examine two other dimensions of globalization, namely international migration and international finance. There are important synergies between all three dimensions of globalization: migration tends to promote trade, and trade tends to

promote international financial linkages. Just as Texas tends to trade a lot with Mexico, so too do the many immigrants who live in Texas come from Mexico. Geography and network effects seem to play a pivotal role in explaining these patterns.

Financial globalization is the third dimension of global linkages that matters. Arguably the world has seen greater changes in this dimension of globalization over the past quarter century than in the other two. The recent global financial crisis would have taken a very different course were it not for the enormous increase in cross-border flows of capital in recent decades. However, this is the dimension of globalization for which we have the weakest data at the level of individual U.S. states. We will simply report what little data do exist, and leave for future work the challenge of documenting more accurate measures of financial globalization at the state level.

Before proceeding, we might note that the issue of whether international linkages — be they in the form of trade, migration or investment — are beneficial to the home or host countries or states remains controversial in the public discourse, although the economics seems quite clear cut. Whereas professional economists tend to emphasize the gains from trade in the form of lower prices and increased product variety for consumers, and enhanced economic efficiency, the political debate tends to be driven by the fortunes of those who lose out from freer trade. In the 1980s, this took the form of concerns about the "Rust Belt" as U.S. manufacturing faced increased international competition from countries like Japan and South Korea.[2] In the early 1990s, concerns were voiced about the "giant sucking sound" that some feared would accompany the adoption of the North American Free Trade Agreement (NAFTA). Following the information technology revolution that kicked into high gear in the late 1990s, many service sector jobs that were previously considered safe from international competition became "offshoreable". And with the integration of China and other large emerging market economies into the global economy in the twenty-first century, attention shifted to the scale of the job losses in the U.S. and other advanced economies associated with the "China shock."

Likewise, the extent to which international migration has detrimental effects on U.S. labor

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[2]Crandall (1993) reviews the "rust belt" phenomenon and the associated job losses.

markets has waxed and waned as an issue in U.S. political discourse over the decades. All of these issues are reviewed at length elsewhere: Collins (1998) and Kletzer (2002) are good summaries of what we knew about job creation and destruction associated with international trade as of the turn of the century; Bhagwati and Blinder (2009) is a good summary of the debate on offshoring; Autor, Dorn and Hanson (2013) provide estimates of the job losses in the United States associated with the China shock; Borjas (2014) provides an overview of the literature on immigration and its effects on wages. We will not touch on these controversies directly in what follows. Rather, our analysis complements this work by highlighting the diversity of international linkages at the level of individual states. While a more diverse set of trading partners, for example, will not prevent job losses associated with international trade, it should, in principle, make employment in a state less exposed to developments in any one of its trading partners.

2 Related literature

There is a large literature on the international trade patterns of U.S. states. Cassey (2011) is a comprehensive survey of much of the earlier work in the 1990s and 2000s. Coughlin and Cartwright (1987) examine the effectiveness of state export promotion efforts and actual state exports, and find that expenditures on export promotion do have their desired effects. Erickson and Hayward (1991) document international trade patterns at the level of U.S. census regions and model trade flows using a standard gravity-like model. Cronovich and Gazel (1998) examine the relative importance of real exchange rates and foreign incomes as determinants of state exports. Coughlin and Pollard (2001) examine the different growth rates of state exports from the late 1980s through the late 1990s and document the importance of competitiveness as opposed to industry mix as the key driver of better performance relative to the national average.

The importance of immigrant links as a source of trade linkages was first explored by Gould (1994). Many subsequent authors have explored the relationship between migration and trade in greater depth. Bandyopadhyay, Coughlin and Wall (2008) explore the impor-

tance of ethnic immigrant networks as drivers of overall exports from U.S. states to a panel of 29 countries. They use data on foreign-born residents in each state from the decennial censuses of 1990 and 2000, and find that the networks only seem to matter for a subset of countries. Herander and Saavedra (2005) use data on the number of immigrants in each state as counted in the 1990 census to explore the importance of immigrant networks for exports from individual states. Peri and Requena-Silvente (2010) do a similar study for exports from 50 Spanish provinces to a sample of 77 countries between 1995 and 2008 and find that the importance of immigrants for exports is greatest for differentiated goods and for countries that are culturally distant from Spain.

The synergies between trade finance and international trade are explored in Claessens, Hassib and van Horen (2015) and Niepmann and Schmidt-Eisenlohr (2015). Claessens, Hassib and van Horen (2015) examine the importance of internationally active banks as facilitators of international trade through their brick-and-mortar foreign operations. They find that in the period immediately prior to the global financial crisis (1995-2007), the local presence of foreign banks from an importing country is associated with higher exports, especially in sectors that are most dependent on trade finance. Niepmann and Schmidt-Eisenlohr (2015) examine the synergies between international finance and international trade from a different perspective, namely that of banks as risk mitigators in international trade.

Cadot, Carrère and Strauss-Kahn (2011) examine the question of diversification of exports from a sample of 156 countries over a 19-year period, and document the existence of a clear hump-shaped pattern relative to stage of development, namely that export diversification tends to increase with income level (as measured by per capita GDP in purchasing power parity dollars) before a pattern of re-concentration kicks in at an income level of around $25,000 per capita (in constant 2005 international dollars). Agosin, Alvarez and Bravo-Ortega (2012) examine the determinants of export diversification over the 1962-2000 period in a sample of 79 countries, and find that more open economies tend to have more diversified exports. Greater levels of human capital tend to be associated with more diversified export patterns, while remoteness tends to be associated with greater specialization.

Apart from the snapshot of patterns of specialization in export patterns of individual

states in Cassey (2011), there seems to be relatively little work documenting these patterns and how they evolve over time. Our contribution is to document the evolution of specialization over time, differentiating between specialization by destination and specialization by product. We go further by comparing the patterns of specialization in trade with the diversity or otherwise of a state's immigrant population, and ask whether states with more diverse immigrant populations also have more diverse trade patterns. We also provide some evidence on the diversity of a state's international financial linkages, although as already noted and to be explained in further detail below, the data we use are very imperfect measures of the financial links between individual states and the rest of the world.

3 Data

We are interested in seeing how diversified the various U.S. states are in terms of their international trade linkages, immigrant linkages, and financial linkages. When it comes to measuring trade linkages, we focus on export links only, as there are no data on imports by individual state. There are relatively good data on numbers of immigrants by state from both the decennial census and the American Community Survey, which we will discuss in more detail below. We are on the shakiest ground when it comes to measuring financial linkages. International financial linkages can take many forms. It would be interesting to know, for example, how internationally diversified investment portfolios are of the residents of each state, or how diversified (by origin) the stock of foreign direct investment in each state is, but the requisite data to measure these dimensions of diversification are not available. We therefore focus on a simple measure of international financial linkages that is derived from data on the presence of foreign banking organizations in each state.

3.1 Trade linkages

For U.S. states' exports data, we use the Origin of Movement (OM) data compiled by the U.S. Bureau of Census and available from the World Institute for Strategic Economic Research (WISER). These data detail the value of exports from all 50 U.S. states, the District

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of Columbia, Puerto Rico, and the U.S. Virgin Islands to over 200 foreign destinations. In most cases these destinations are countries, but territories and other claimed land are often included. These data are measured at the port of exit and include the cost of inland freight and insurance. The OM data provide export information by industrial subsectors, classified using the North American Industry Classification System (NAICS) system. Exports data are reported at the three-digit level of detail where industrial subsectors such as "agricultural production" (NAICS 111), "food manufacturing" (NAICS 311), and "merchant wholesalers, nondurable goods" (NAICS 424) are listed. The OM series contain state exports for 32 subsectors, but excludes exports of services, the production sector that is the largest share of U.S. economy (more than 60 percent of nominal GDP).

The key feature of the state export data is its focus on the location from which exporting begins rather than on the location from which the exported goods are produced. Cassey (2009) gives a complete description of the OM data and also performs tests for data quality. One potential problem is that since the state export data are measured at the port of exit, the origin of movement could be the state in which shipments produced in other states are consolidated. Cassey (2009) argues this problem is not too widespread to prevent the use of the OM data in the context of documenting state export patterns.

3.2   Immigrant linkages

States' foreign-born immigrant population data are from the American Community Surveys (ACS) for the period 2005 to 2013 and the decennial census for 1990 and 2000.[3] The ACS provide annual estimates of foreign-born population by surveying about 3 million households each year, for geographic areas with a population of 65,000 or more.

The ACS collects detailed information on the characteristics of the U.S. population and housing. It has the advantage of continuous measurement by producing new data every year rather than every 10 years for the decennial census. However, because it is sent to far fewer households (1 in 100) compared to the decennial census (1 in 6 households), it is subject to

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[3]ACS and Decennial Census data can be downloaded from the Minnesota Population Center's IPUMS, http://usa.ipums.org/usa

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a relatively larger margin of error, especially for smaller geographic areas.

Foreign-born population data for 1990 and 2000 are from the decennial census.[4] These surveys offer estimates of the foreign-born population with detailed demographic, social, and educational and economic characteristics. This provides a comprehensive tool for studying immigrant population at the national and state level.

3.3 Financial linkages

International financial linkages at the level of individual states are more challenging to document. We rely on data reported quarterly by the Board of Governors of the Federal Reserve System on U.S. operations of foreign banking entities. These are available quarterly from 1997 and include information on the location of U.S. offices, the type of U.S. office (e.g. whether a representative office with no U.S. assets or a branch with U.S. assets), as well as whether the U.S. office has established an international banking facility.

At the end of the first quarter of 1980, foreign-owned banks and the U.S. branches and agencies of foreign banking organizations had U.S. assets amounting to $216 billion, or 10.8 percent of all bank assets in the U.S. By the fourth quarter of 2013, this figure had increased to $3.5 trillion, or 22.1 percent of U.S. bank assets. Foreign banks' shares of commercial and industrial loans increased over the same period from 14.1 percent to 25 percent of the total outstanding loans in the U.S.

As of the end of 2013, there were 436 foreign banking organizations operating in the United States, of which 131 were representative offices with no U.S. assets. Unsurprisingly, the state with the most foreign banking operations was New York, with 196, followed by California (with 67) and Florida (with 48). Fifty-four different countries had at least one foreign banking organization in the United States at the end of 2013, with 48 of these countries having offices in New York. The country with the most bank offices in the United States at the end of 2013 was Japan, with 45, followed by Switzerland (with 42) and Canada

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[4]The Census Bureau defines the term foreign born, as "people who are not U.S. citizens at birth." The foreign-born population includes immigrants, legal non-immigrants (e.g., refugees and persons on student or work visas), and persons illegally residing in the United States.

(with 40). In terms of diversity across the United States, Swiss banks had offices in 18 states, followed by the U.K. with offices in 12 states, and Canada and the Netherlands with offices in 11 states.

4   Measures of specialization and diversification

Our objective is to see how diversified or specialized U.S. states are in terms of trade, immigration and financial linkages, and the degree to which that concentration has changed over time. Our dataset comprises data on U.S. state exports, foreign-born population and total bank deposit data for all fifty states, which we use to compute the various measures of diversification.

4.1   Diversity of trade patterns

We start by documenting patterns of specialization in trade. The detailed data we have on trade patterns allow us to document patterns of specialization and diversification by geographic destination as well as by product.

The Hirschman-Herfindahl index is widely used in the industrial organization literature to measure concentration (Sapir, 1996), and has also been used by others to quantify export diversification (see for example Cadot, Carrère and Strauss-Kahn (2011)). The normalized version of this index is defined as

$$H_{s,t}^{\text{Destination}} = \frac{\sum_{c=1}^{C_{s,t}^X} \left(\phi_{c,s,t}^x \right)^2 - \frac{1}{C_{s,t}^X}}{1 - \frac{1}{C_{s,t}^X}} \tag{1}$$

where $\phi_{c,s,t}^x = x_{c,s,t} / \sum_{c=1}^{C_{s,t}^X} x_{c,s,t}$, i.e. the exports to country c of state s at date t ($x_{c,s,t}$) as a share of the total exports of state s at date t, and $C_{s,t}^X$ is the number of countries that state s exports to at date t. The evolution of the Hirschman-Herfindahl index of export specialization reveals to what extent a region is becoming more specialized or diversified,

regardless of how the economic structures of other regions are evolving. A higher index indicates that the region exports to a smaller group of countries and hence is more specialized or less diversified. We will use this index as our baseline measure of specialization or diversification.

Since we also have data on the product composition of each state's exports we can compute a second measure of specialization by product as

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H_{s,t}^{\text{Product}} = \frac{\displaystyle\sum_{n=1}^{N_{s,t}^{X}} \left(\phi_{n,s,t}^{x}\right)^2 - \frac{1}{N_{s,t}^{X}}}{1 - \frac{1}{N_{s,t}^{X}}}
\tag{2}
$$

where $\phi_{n,s,t}^{x} = x_{n,s,t}/\displaystyle\sum_{n=1}^{N_t} x_{n,s,t}$, i.e. the exports of product n from state s at date t $(x_{n,s,t})$ as a share of the total exports of state s at date t, and $N_{s,t}^{X}$ is the number of products that state s exports at date t.

Figure 1 shows the Hirschman-Herfindahl indexes by export destination for all fifty states. Perhaps not surprisingly, one of the least diversified states by export destination is Michigan. Most states seem to have relatively diversified export patterns, or, to the extent that they do not, have tended to become more diversified over time. A notable exception is North Dakota, where exports have become more geographically concentrated over time and has become the least diversified state in the nation, due, no doubt to the recent oil boom in that state. Note that we do not see similar patterns in the other big oil states, Texas and Alaska.

The most diversified states are Florida, Maryland, Louisiana and Georgia. These states export to a large number of trading partners, and their top 5 partners account for 30–40 percent of total exports. In contrast, the least diversified states, including North Dakota, Maine, South Dakota and Michigan, have much larger export shares to fewer trading partners. North Dakota sells 79 percent of its exports to Canada, while Maine, South Dakota, and Michigan, respectively, send 55 percent, 45 percent, and 46 percent of their exports to Canada, their largest trading partner.

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The nation's largest states in terms of gross state product have varying degrees of diversification in their export destinations. California ranked No.6 in terms of diversification of trading partners, while Texas ranked 37th among the states in 2014. New York and Florida came in 16th and first place, respectively.

Figure 2 shows the Hirschman-Herfindahl indexes by export product for all fifty states. Note that the patterns of diversification by product differ from the patterns of diversification by destination. In particular, note that there is less diversification by product than is by destination.[5] States such as New Mexico, West Virginia and Vermont stand out as having the least diversified international trade patterns by product, although in all three cases they have become more diversified over time. Texas also stands out in having a relatively diversified (and stable) export pattern by product, contrary to the popular perception of the state being heavily dependent on oil and energy-related products. States that have diversified their export basket the most since 1997 include New Mexico, Wyoming and Idaho. On the other hand, Alaska's and Washington's exports have become less diversified over time. Indeed, while Washington state exported more than $90 billion worth of merchandise in 2014, exports of transportation and equipment (primarily aircraft, engines and parts assembled by Boeing) accounted for 57 percent of total exports, making its export mix one of the nation's most concentrated.

Vermont, the least diversified (most specialized) state, mainly exports computers and electronic products, which accounted for 69 percent of its total exports in 2014. Exports of chemical manufactures accounts for 57 percent of Wyoming's total exports, while exports of fish and fish products dominate Alaska's exports, at 46 percent of the state's exports. Virginia, Pennsylvania and North Carolina are the nation's most diversified (least specialized) states. The top five export products make up 56 percent of Virginia's and Pennsylvania's total exports and 61 percent of North Carolina's. Virginia's top export product, chemicals, accounts for 16 percent of its total exports, followed by computer and electronic products (13 percent) and transportation equipment (10 percent). Pennsylvania's are chemicals (17

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[5]Although this may partly be due to the highly aggregated nature of the product data we use, specifically just 18 categories at the 3-digit level.

percent), machinery (11 percent), and transportation equipment (10 percent). North Carolina's top exports are chemicals (18 percent), machinery (13 percent), and transportation equipment (13 percent).

The nation's largest states vary in their export concentration. California's top export, computer and electronic products, accounts for 25 percent of its total overseas sales, while Texas's largest export, petroleum and coal products, makes up 21 percent of all goods exports. New York and Florida's chief exports, respectively, account for 33 and 24 percent of their total exports. These largest four states, respectively, ranked eigth, 18th, 25th, 13th, among states in terms of diversification of export products.

4.2 Diversity of immigrant links

We next examine the diversity of each state's immigrant body. As noted above, we use data from the regular decennial census as well as annual data from the American Community Survey. Let $m_{c,s,t}$ denote the number of immigrants from sending country c in state s at date t. Define $\xi_{c,s,t}^m = m_{c,s,t} / \sum_{c=1}^{C_{s,t}^M} m_{c,s,t}$, i.e. the share of total immigrants in state s at date t that come from country c, where $C_{s,t}^M$ denotes the number of countries from which immigrants to state s have come at date t. We can define a normalized Hirschman-Herfindahl index for the composition state s immigrant body as

$$H_{s,t}^{\text{Immigrant}} = \frac{\sum_{c=1}^{C_{s,t}^M} \left(\xi_{c,s,t}^m \right)^2 - \frac{1}{C_{s,t}^M}}{1 - \frac{1}{C_{s,t}^M}} \tag{3}$$

when we are looking at concentration by source country.

Figure 3 plots the evolution of the Hirschman-Herfindahl indexes for each state's immigrant body. We include in the chart the calculated values for 1990 and 2000 using census data so as to provide a slightly longer time series perspective since the ACS data only start in 2005. Again, we see interesting differences in the diversity of state's immigrant groups.

For example, Texas, New Mexico and Arizona have relatively less diverse immigrant groups, perhaps not surprisingly as border states. All three states have relatively high percentages of immigrants from Mexico. Note that this is less true of the fourth state that borders on Mexico, California, although it too has a less diverse immigrant body than other big states, like New York or Florida. The extent of immigrant diversity remained relatively the same for most states over the 1990 to 2014 period, with a few exceptions. Arkansas, Colorado and Utah were more diversified in 2014 compared with 1997, while Maine's immigrant mix became less diversified in that period. Other states, such as Arizona, Colorado and Nevada exhibit a hump-shaped pattern as the states changed from a more to a less diversified immigrant body.

4.3 Diversity of financial links

Let $a_{c,s,t}$ denote the U.S. office assets of foreign banking organizations from country c in state s at date t. Define $\omega^a_{c,s,t} = a_{c,s,t}/\sum_{c=1}^{C^B_{s,t}} a_{c,s,t}$, i.e. the share of all foreign bank assets in state s at date t that come from country c, where $C^B_{s,t}$ denotes the number of countries with foreign banking operations in state s at date t. As with trade and immigrant links, we can define a Hirschman-Herfindahl measure of concentration of financial assets as

$$H^{\text{Finance}}_{s,t} = \frac{\sum_{c=1}^{C^B_{s,t}} \left(\omega^a_{c,s,t}\right)^2 - \frac{1}{C^B_{s,t}}}{1 - \frac{1}{C^B_{s,t}}} \tag{4}$$

when we are looking at concentration by country source of the assets.

Figure 4 plots the evolution of the Hirschman-Herfindahl indexes for financial linkages. The data here are less representative of actual international financial linkages than the data on trade and migrant stocks are of trade and migration links. Nevertheless, we see some interesting patterns. To begin with, there are lots of states where the index takes on the value of 1. These states have foreign bank assets from just one country and hence their assets are

heavily concentrated. In fact, this is true of almost all of the fifty states, the exceptions being California, Connecticut, Delaware, Florida, Illinois, New York, Texas and Washington. Not surprisingly, New York has the most diverse representation of foreign banking organizations, with Florida next, followed by California. The diversity of foreign banking operations in Illinois has declined significantly over time.

The Hirschman-Herfindahl measures of U.S. states' diversification are robust to alternative market concentration metrics such as the Theil entropy and Gini indexes. The pairwise correlation between Hirschman-Herfindahl index and the Theil and Gini indexes confirm the measures behave similarly and are highly correlated for all measures of economic linkages discussed.[6]

4.4   Discussion

It is interesting to consider the three dimensions of globalization in combination for a select number of states that are more keyed into the global economy. **Figure 5** plots the evolution of the concentration indexes for six large states. Not surprisingly, New York is highly diversified along all three dimensions of globalization, followed closely by Florida.

How do the various measures of diversification correlate with each other? Do states with more diverse immigrant groups tend to export to a more diverse group of countries, as the results of Gould (1994) might suggest? We calculated the average values of the various Hirschman-Herfindahl indexes for each state over the sample periods for which they can be computed. **Figure 6** presents a series of scatterplots of the various measures against each other. Most of the correlations are fairly weak, but they are positive in all cases. More diversity along one dimension of globalization at the state level is correlated with more diversity along other dimensions of globalization. The strongest pairwise correlation is

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[6]Results from the Hirschman-Herfindahl, Theil and Gini indexes show that the levels of economic diversification across states tend to vary across the diversification measure used, but the metrics broadly give consistent results. The pairwise correlations between Hirschman-Herfindahl index and the Theil and Gini indexes show that the seven out of eight of the correlations range from 0.75 to 0.97. The correlation of the Hirschman-Herfindahl and the Gini index for our export-by-destination measure is the lowest at 0.58. Correlations between the Herfindahl and Theil indexes are generally higher across the measures we look at, while the Gini correlations are smaller. Further analysis and details on robustness checks are available upon request.

between the diversity of exports by destination and the diversity of foreign banking assets.

Finally, we asked whether the diversity of a state's trade pattern might be related to the diversity of the state's economy. Is it easier for a state to export a diverse range of products if it also produces a diverse range of products? **Figure 7** suggests that is in fact the case.

4.5 Determinants of diversity across states

We run a simple panel regression exercise to determine some of the factors that explain the variation in economic diversity based on existing literature and studies. For instance, Hummels and Klenow (2005) empirically estimate a link between economy size, measured by total income, and the overall degree of specialization. They find that the export of a wider set of goods is the primary avenue for export growth of larger economies. Funke and Ruhwedel (2001) also find the variety of both exports and imports to be positively correlated with per capita income across 19 Organization for Economic Cooperation and Development (OECD) countries. Imbs and Wacziarg (2003) show the existence of a non-linear relationship between income and production diversification; as income per capita rises, production concentration falls and begins to rise after a certain level of income is reached. Klinger and Lederman (2004) and Cadot et al. (2011) find a similar pattern for exports. Gutierrez de Pineres and Ferrantino (1997) analyze the experience of Chile since the mid-1970s and find a positive effect of real exchange rate depreciation and trade reforms on export diversification. Amiti and Venables (2002) suggest that proximity to world markets and presence of other geographical characteristics such as the accessibility of water transport influences the economic structure of a country.

Mayda (2010) empirically investigates the determinants of international bilateral migration flows and finds that income opportunities significantly increase migration rates, as do costs of migration. The further away two countries are, the higher the monetary travel costs for the initial move, as well as for visits back home. Therefore, a common land border encourages migration flows, as land travel is often cheaper than air travel. Additionally, network effects play a role in explaining migration rates as documented in Espinosa and Massey

(1997). Since immigrants are likely to receive support from other immigrants from the same home country, they will have an incentive to choose destinations with larger communities of fellow citizens.

Based on these findings, we narrow the determinants into 5 groups:

1.   *Geography* – Does the geographic location of a state explain some of the variability in the indexes? We use dummy variables for states that share a border with Mexico (North border dummy) and with Canada (South border dummy). We also consider the impact of access to the ocean or Great Lakes on the diversity of the various measures of globalization. States that share a border with a foreign country might be expected to have a higher concentration of immigrants from those countries, and states that have a coastal border might export to a broader range of countries than landlocked states. McCallum (1995) found that sharing a border led to increased trade between U.S. states and Canadian provinces.

2.   *Economic size/income leve*l – We use data on real per capita consumption expenditures to capture the different consumption patterns across states. Do wealthier states differ from states that have less consumption spending with regard to the extent of their diversity? Immigrants might be more attracted to wealthier states as these may have more economic opportunities than poorer states. Indeed, Mayda (2010) and Grogger and Hanson (2011) show that destination income-per capita is a key determinant of migration choices.

3.   *State policies* – For this, we use tax burdens imposed on residents by states as a proxy for varying policy stance across states. The data used are per capita state taxes that include both state and local taxes, as reported by the U.S. Tax Foundation.[7] Do states that pay less in-state taxes attract more foreign banks or immigrants?

4.   *Economic structure* – How does the diversity of a state's production structure mean for the overall diversity of its trade, migration and financial patterns? We would expect that states that produce a diverse range of products to export a wide range of products.

5.   *Exposure to foreign countries and cultures* – We use data on the amount of personal consumption expenditures U.S. residents spend on foreign travel as a share of total personal expenditures related to services. We also look at travel expenditures in the U.S. by non-

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[7]http://taxfoundation.org

U.S. residents. Does exposure to global consumption patterns and cultures explain any variability in the diversity measures we look at? Foreign country travel might establish networks and connections that could promote trade and banking relations between home and foreign countries.

Table 1: Determinants of Economic Diversification: Regression Results

		Hirschman-Herfindahl Indexes (HHI)			
Independent variables		Exports by Destination (3)	Exports by Product (4)	Immigrants (5)	Foreign Bank Assets (6)
Geography	Border dummy: North	0.092*** (0.005)	0.051*** (0.008)	0.012 (0.001)	-0.152*** (0.032)
	Border dummy: South	0.017** (0.008)	0.052*** (0.014)	0.250*** (0.012)	-0.277*** (0.042)
	Coastal states dummy	-0.045*** (0.005)	-0.093*** (0.008)	-0.079*** (0.008)	-0.161*** (0.044)
Economic size/Income levels	Per-capita Real Personal Consumption Expenditures	-0.000 (0.001)	-0.001 (0.001)	-0.000 (0.001)	0.015*** (0.005)
Policy	Tax burden	-0.014*** (0.004)	0.007 (0.007)	-0.009 (0.006)	-0.128*** (0.023)
Economic structure	Diversity of state's production base	-0.003 (0.026)	0.607*** (0.043)	0.154*** (0.036)	0.407** (0.191)
Exposure to foreign countries and cultures	Expenditure on foreign travel by U.S. residents as a share of services PCE	-0.007* (0.004)	0.001 (0.006)	-0.0121** (0.006)	-0.015 (0.020)
	Expenditure in the U.S. by nonresidents as a share of services PCE	0.004*** (0.001)	0.001 (0.001)	0.005*** (0.001)	0.001 (0.003)
	Adjusted R-squared	0.39	0.35	0.67	0.29
	Observations	800	800	426	344

Robust standard errors are in parentheses.***p<0.01, **p<0.05, *p<0.1. The reduced number of observations in columns (5) and (6) is due, respectively, to the lack of data on foreign-born population by state for the period before 2005, and the limited number of states with foreign bank assets. See Table 5 in the Appendix for the summary statistics of each regression variable.

Regression results are reported in **Table 1**. These are based on available data for each variable for the 1997-2014 period. In column 3 are the estimates of exports-by-destination

Hirschman-Herfindahl index (HHI) using the five variables discussed (geography, scale, policy etc.). As expected, the coefficients of geography variables are all statistically significant in explaining concentration of export destinations. The coefficient of the border dummies are positive, implying that states that border Canada and Mexico export to a fewer set of countries than non-border states. States that border Canada are particularly more concentrated than those that border Mexico. The coefficient on the *North dummy* is 0.092 and highly significant compared with the *South dummy* (0.017 coefficient and significant at the 5 percent level).

The coefficient of coastal states dummy is negative and statistically significant at the 1 percent level – states that have direct coastal access export to a wider range of countries than landlocked states. Exposure to foreign countries and cultures also explains the concentration on export patterns. States whose residents spend more on foreign travel as a share of total expenditures on services have a more diversified export market, lending support to the hypothesis that exposure to foreign markets fosters business relationships and networks that could lower costs of entry into these markets. Surprisingly, however, states that have more expenditure by foreign residents have a more concentrated export market, with a statistically significant coefficient at 1 percent level.

Column 4 shows the estimates of the concentration of exports by product. Four variables prove to be statistically significant in explaining cross-state variations in export basket concentration. States that have coastal access export a wider range of products (i.e. are more diversified) than landlocked states, while states that share a border with either Canada or Mexico have a less diversified export basket. Additionally, and as expected, states that have a more diversified production base and produce a wide range of products, export a more diverse range of products.

Immigrants tend to be concentrated in those states that border the U.S. to the South. States that border Mexico have a much more concentrated immigrant mix, as shown by the magnitude and significance of the regression coefficient (0.250 and highly significant at the 1 percent level). The coefficient for the *North dummy*, however, is positive and not statistically significant. Sharing a border with Canada does not statistically explain the

diversity of states' immigrant population. However, states that have a coastal border have a more diverse immigrant mix. Additionally, states that have a diversified economic structure (as measured by the Hirschman-Herfindahl index of states' gross state product), attract a diverse mix of immigrants, as do states where residents spend more on foreign travel. However, neither the amount of taxes levied by states nor the income levels of residents statistically explain the concentration of migrants' location.

Finally, the concentration of foreign banking baking assets shown in column 6 is explained by all but two of the variables we look at – those related to the exposure of residents to foreign countries and cultures.[8] States that share a land or coastal border with a foreign country have a more diversified foreign banking presence. Interestingly, states with a higher tax burden also tend to be more diversified in terms of foreign banking assets. On the other hand, the sign of the regression coefficient on per-capita real personal consumption expenditures is positive and statistically significant at the 1 percent level, implying that wealthier states have a less diversified foreign banking presence. And contrary to our expectation, the exposure of states' residents to foreign countries, as proxied by foreign travel expenditures, does not statistically explain the diversification of states' foreign banking activity.

Overall, however, geography and network effects play the dominant roles in explaining cross-state diversity patterns. Exposure to foreign countries and cultures influences the location of immigrants and the destination of exports, while geography explains diversity of all four measures of globalization considered.

4.6   Diversity relative to the United States

U.S. policy as regards foreign trade, immigration and cross-border banking is set at the federal rather than the state and local level. In principle, it is as easy for a company in New York to export as it is for a company in Kansas. Likewise, it is as easy for an immigrant from India to settle in Florida as it is for that same immigrant to settle in California. And a foreign banking organization seeking to set up shop should find it as easy to do so in Texas

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[8]Regression results of foreign banking assets should be interpreted with caution because of the limited foreign financial and banking data available at the state-level.

as in New York. Of course other factors matter, starting with geography in the case of trade. Immigrants find it more attractive to settle where there is already a large group from their home country. And financial organizations will typically want to set up shop where there are already a large number of other financial organizations.

We can construct some simple measures of how specialized states are by simply comparing how many countries a state exports to relative to how many countries the U.S. as a whole exports to. That is, we define

$$D_{s,t}^X = \frac{C_{s,t}^X}{C_{US,t}^X} \tag{5}$$

where $C_{s,t}^X$ is the number of countries that state s exports to at date t, and $C_{US,t}^X$ is the number of countries that the United States as a whole exports to at date t.

A similar measure can be constructed for immigration:

$$D_{s,t}^M = \frac{C_{s,t}^M}{C_{US,t}^M} \tag{6}$$

where $C_{US,t}^M$ is the number of countries from which immigrants to the United States have come from at date t.

Alternatively, we explore the similarity of states' exports relative to the nation's. Using an export similarity index proposed by Finger and Kreinin (1979), we calculate a measure of the similarity between the sectoral and geographic concentration of states' exports to that of the nation. The index is based on the export shares of each product or destination in each state's total exports relative to the national share. For each product and destination, the minimum between the state product or destination share and national share is computed. These minimum shares are summed across all products or destinations each state exports and the sum is multiplied by 100. This index is defined as

$$ESI(sus, w) = 100 * \sum_j \min \left[\frac{X_{j(s,w)}}{\sum_j X_{j(s,w)}}, \frac{X_{j(US,w)}}{\sum_j X_{j(US,w)}} \right] \tag{7}$$

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where $ESI(sus, w)$ refers to the export similarity index of state s and overall US to the world w, $X_{j(s,w)}$ refers to the exports of product j from state s to the world and similarity $X_{j(US,w)}$ refers to exports of product j from the US to the world. $\sum_j X_{j(s,w)}$ and $\sum_j X_{j(US,w)}$ are total exports of state s and US to world w, respectively. This index ranges from zero, indicating complete dissimilarity, to 100, indicating the state's product and destination distribution of exports is identical to the national distribution, and the state and nation are perfect competitors. An index value close to 100 can be interpreted that the two regions are competitors in the common market. The same index is computed based on export destination.

Table 2 shows a wide range of export similarities by product with values for 2014 ranging from 26.1 for Alaska, which indicates little similarity with the national distribution, to levels exceeding 80.0 for Illinois, Florida and Virginia. The table also shows how the index changed during the 1997-2014 period. The export similarity index increased for 28 of the 50 states, indicating that the product distribution of exports from these states became more similar to the national distribution. On the other hand, 22 states experienced declines over this period, indicating their exports became more differentiated from the national distribution. New York had the largest decline of 16.9 points.

The importance of specific export destinations has also changed over time and varies across states. **Table 3** shows export similarities by geographic destinations of state exports. The 2014 index varies from 40.6 for Hawaii to 84.7 for Tennessee. Nine other states had index values exceeding 80, indicating close similarity of these states' geographic distribution to the national distribution. The table also shows how the geographic concentration of each state's exports has changed during the 1997-2014 period. 34 states experienced an increase in the index during this period, while 16 states saw a decrease. The largest decrease was in Connecticut.

We also looked at a somewhat simpler measure of the diversity of a state's international banking relationships, one defined as the number of different countries that have a banking presence in the state as a share of the total number of countries with a banking presence

Table 2: Export Similarity Index by Export Product

State	1997	2014	Difference between 1997 and 2014
Alabama	69.8	61.5	-8.3
Alaska	18.4	21.6	3.2
Arizona	57.0	71.5	14.5
Arkansas	63.8	71.7	7.8
California	73.6	76.3	2.7
Colorado	62.3	68.0	5.7
Connecticut	74.9	65.1	-9.7
Delaware	52.3	64.7	12.5
Florida	83.9	83.0	-0.9
Georgia	76.0	72.1	-3.9
Hawaii	42.6	54.9	12.4
Idaho	47.4	52.0	4.6
Illinois	82.3	83.1	0.8
Indiana	70.5	70.4	-0.1
Iowa	59.0	58.4	-0.5
Kansas	56.3	66.1	9.7
Kentucky	70.0	62.8	-7.2
Louisiana	32.0	41.5	9.5
Maine	50.8	47.7	-3.1
Maryland	72.4	78.2	5.8
Massachusetts	69.0	65.7	-3.3
Michigan	56.5	64.7	8.2
Minnesota	72.5	72.3	-0.2
Mississippi	56.2	64.6	8.4
Missouri	68.0	72.2	4.2
Montana	45.7	58.1	12.3
Nebraska	54.1	51.1	-3.0
Nevada	54.4	45.3	-9.1
New Hampshire	66.5	54.8	-11.7
New Jersey	70.0	73.6	3.6
New Mexico	38.7	51.1	12.3
New York	74.3	57.4	-16.9
North Carolina	71.6	75.0	3.4
North Dakota	39.7	40.5	0.8
Ohio	68.8	73.7	4.9
Oklahoma	76.0	65.2	-10.8
Oregon	59.8	60.5	0.7
Pennsylvania	78.0	76.8	-1.1
Rhode Island	66.7	53.6	-13.1
South Carolina	63.9	61.7	-2.2
South Dakota	65.8	53.7	-12.1
Tennessee	76.3	78.4	2.1
Texas	82.2	73.0	-9.2
Utah	62.2	58.2	-3.9
Vermont	37.0	42.7	5.6
Virginia	64.2	80.8	16.6
Washington	47.2	49.1	1.8
West Virginia	26.0	45.9	19.9
Wisconsin	74.3	67.3	-7.0
Wyoming	18.2	33.9	15.7

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Table 3: Export Similarity Index by Export Destination

State	1997	2014	Difference between 1997 and 2014
Alabama	83.1	77.7	-5.4
Alaska	35.5	51.9	16.4
Arizona	61.2	65.7	4.5
Arkansas	76.5	78.2	1.7
California	74.6	80.0	5.4
Colorado	72.7	83.7	10.9
Connecticut	76.1	65.3	-10.8
Delaware	67.0	59.9	-7.2
Florida	50.1	54.6	4.5
Georgia	82.2	83.2	1.0
Hawaii	32.7	40.9	8.2
Idaho	64.0	63.3	-0.8
Illinois	79.4	79.8	0.4
Indiana	69.0	76.5	7.5
Iowa	73.0	78.7	5.7
Kansas	79.0	83.4	4.4
Kentucky	70.2	73.4	3.2
Louisiana	60.5	63.9	3.4
Maine	61.8	58.7	-3.1
Maryland	70.1	71.2	1.1
Massachusetts	76.7	73.9	-2.8
Michigan	54.6	68.5	13.9
Minnesota	76.0	79.4	3.3
Mississippi	72.6	68.4	-4.2
Missouri	68.5	80.3	11.8
Montana	57.1	65.4	8.3
Nebraska	71.7	77.2	5.4
Nevada	60.7	62.1	1.4
New Hampshire	71.1	75.9	4.8
New Jersey	79.4	80.3	0.8
New Mexico	32.2	46.2	14.0
New York	74.5	68.1	-6.3
North Carolina	81.5	82.5	1.1
North Dakota	52.0	41.9	-10.2
Ohio	66.4	76.4	10.0
Oklahoma	72.3	75.3	3.0
Oregon	62.6	58.0	-4.5
Pennsylvania	78.3	80.5	2.2
Rhode Island	74.8	71.1	-3.6
South Carolina	75.8	69.9	-5.8
South Dakota	65.1	63.7	-1.4
Tennessee	81.0	84.7	3.8
Texas	64.2	68.5	4.3
Utah	64.5	64.2	-0.4
Vermont	47.6	60.8	13.2
Virginia	68.6	80.3	11.7
Washington	56.6	58.5	1.9
West Virginia	69.2	65.5	-3.7
Wisconsin	75.6	80.2	4.6
Wyoming	62.1	57.7	-4.4

in any U.S. state.[9] As before, let $C_{s,t}^B$ denote the number of countries with foreign banking organizations in state s at date t, and $C_{US,t}^B$ denote the number of countries with foreign banking operations anywhere in the U.S. at date t. Our basic measure of international banking diversity at the state level is defined as follows:

$$D_{s,t}^B = \frac{C_{s,t}^B}{C_{US,t}^B} \tag{8}$$

For example, at the end of 2013 foreign banking organizations from 9 countries had offices in Texas, out of a total representation across all U.S. states of 54 countries. By contrast, foreign banking organizations from 48 of the 54 countries represented had offices in New York.

Figure 8 shows how these measures evolve across states. By construction it is smoother than the Hirschman-Herfindahl index, but it shows essentially the same patterns. Focusing just on New York, we see that almost every bank that has an office in the United States has an office in New York. About 40 percent of the foreign banks that have offices in the United States have offices in California and Florida, while about 20 percent have offices in Texas and Illinois. No other states register as highly in terms of foreign bank representation.

We also looked at just those foreign banking organizations in the U.S. that had established an international banking facility. For example, three Swiss banks had a total of 40 offices across the U.S. at the end of 2013, but only seven of those offices had an international banking facility, with three of these being in New York, two in California and one each in Florida and Connecticut. We construct our second measure of financial diversification by computing the number of countries with which an individual state has an international banking facility as a share of the total number of countries with which there are foreign banking facilities. Let $C_{s,t}^{B*}$ denote the number of countries with foreign banking organizations with an *international banking facility* in state s at date t, and $C_{US,t}^{B*}$ denote the number of countries with foreign banking operations with an international banking facility anywhere in the U.S. at date t.

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[9]We could do a similar calculation with the trade and migration data, although in reality most states have trade relationships with most countries in the world, and all states host immigrants from most countries around the world. Financial relationships are much more concentrated.

Our second measure of international banking diversity at the state level is defined as follows:

$$D_{s,t}^{B^*} = \frac{C_{s,t}^{B^*}}{C_{US,t}^{B^*}} \tag{9}$$

5 Conclusions

This paper documents patterns of globalization along three dimensions (trade, migration and finance) at the level of individual states in the U.S. We combine data from a variety of sources to provide a rich picture of the evolution of globalization in the individual states over the past two decades. While the data available to us are fragmentary at best, they do enable us to construct a reasonable profile of the diversity of international linkages at the state level, and how diversity has evolved over time. One of the interesting findings in the paper is that states that are diversified in terms of their trade patterns are not necessarily very diversified in terms of where immigrants to the state come from. This is even more the case when it comes to financial linkages, but that is more a reflection of the limited state-level data on foreign financial and banking activity.

The review of international linkages in this paper suggests a number of avenues for further research. To begin with, the linkages we examine are asymmetric. On the international trade side, we have good data on state exports, but know relatively little about state imports. Likewise, we have good data on where the immigrants to different states come from, but we know less about where the emigrants from different states go. And even with the limitations imposed by international banking data, it might be interesting to complement the data on foreign baking operations within the U.S. with the overseas operations of U.S. banks.

Second, it is worth asking why we should care about diversity of trade patterns and so on. From the perspective of economic theory, what we are ultimately interested in is the volatility of per capita consumption. Even in the presence of highly specialized trade patterns, it may be possible for the citizens of individual states to insure by other means, for example, by holding diversified portfolios of assets. Addressing this question in a satisfactory manner would require more detailed data on the portfolio positions of the citizens of individual

states.

Figure 1: Diversification of U.S. Exports by Destination Measured by the Hirschman-Herfindahl Index
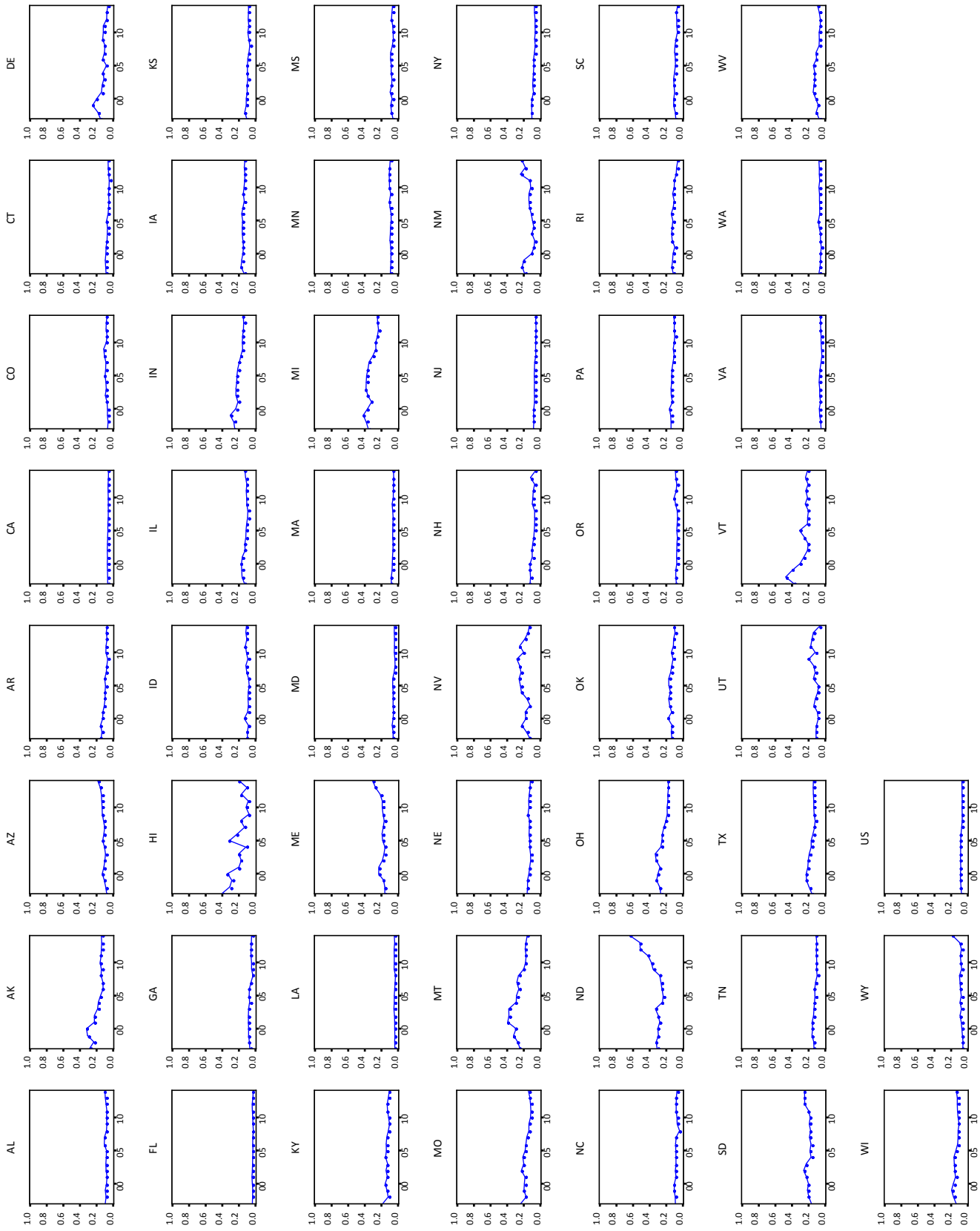
Figure 2: Diversification of U.S. Exports by Product Measured by the Hirschman–Herfindahl Index
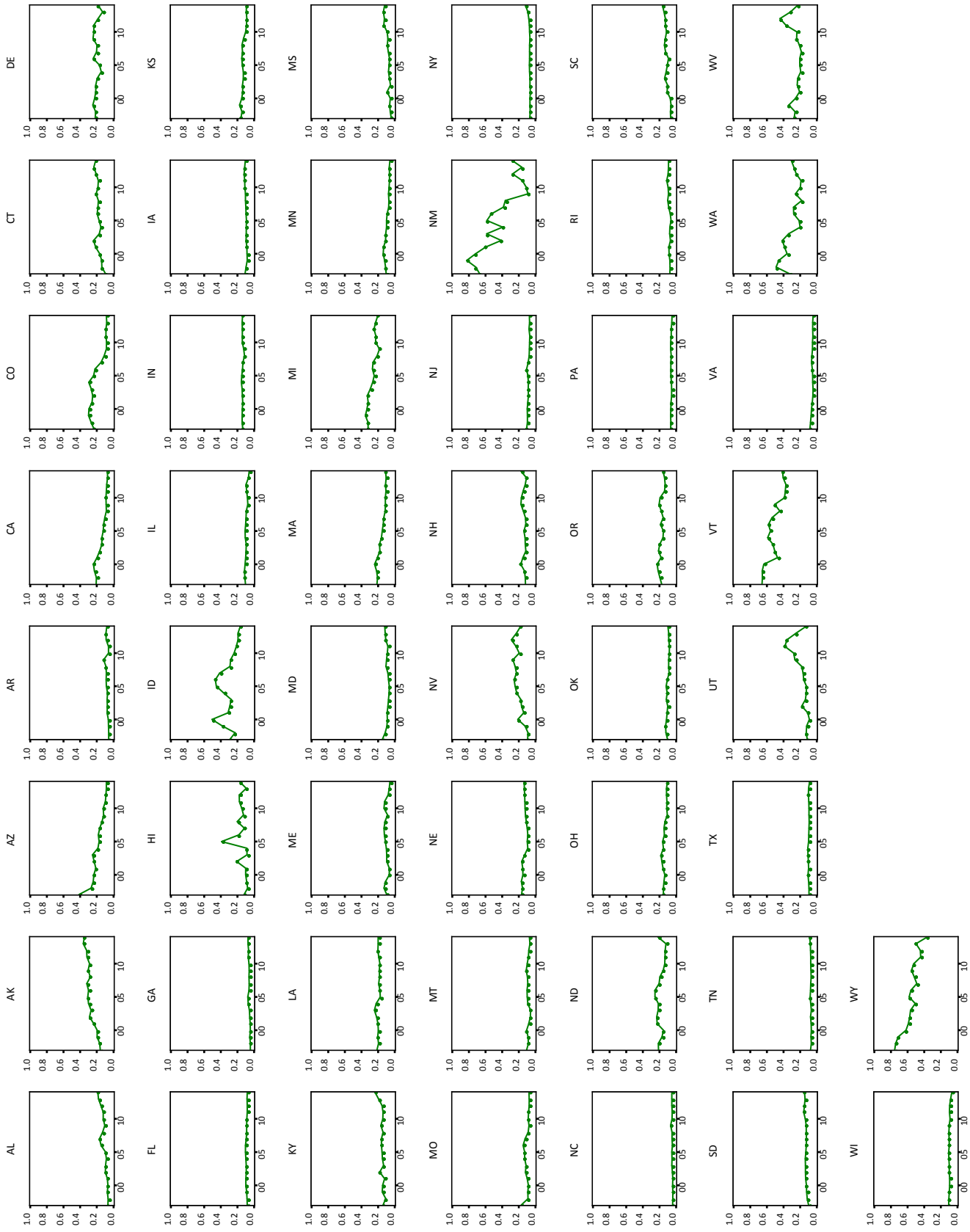
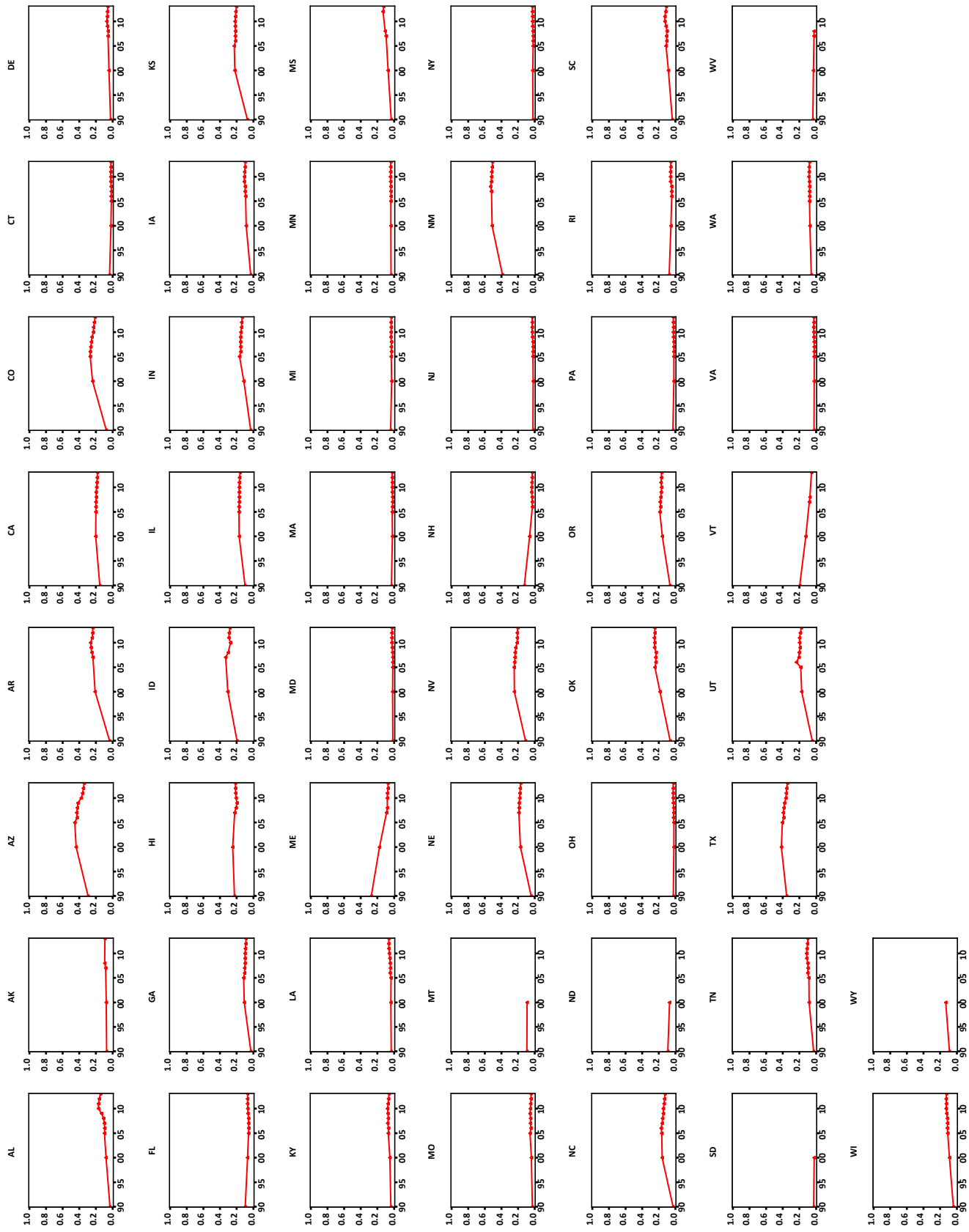**Figure 3: Diversification of Immigrants Measured by the Hirschman-Herfindahl Index**

Figure 4: Diversification of U.S. Foreign Banking Assets Measured by the Hirschman-Herfindahl Index
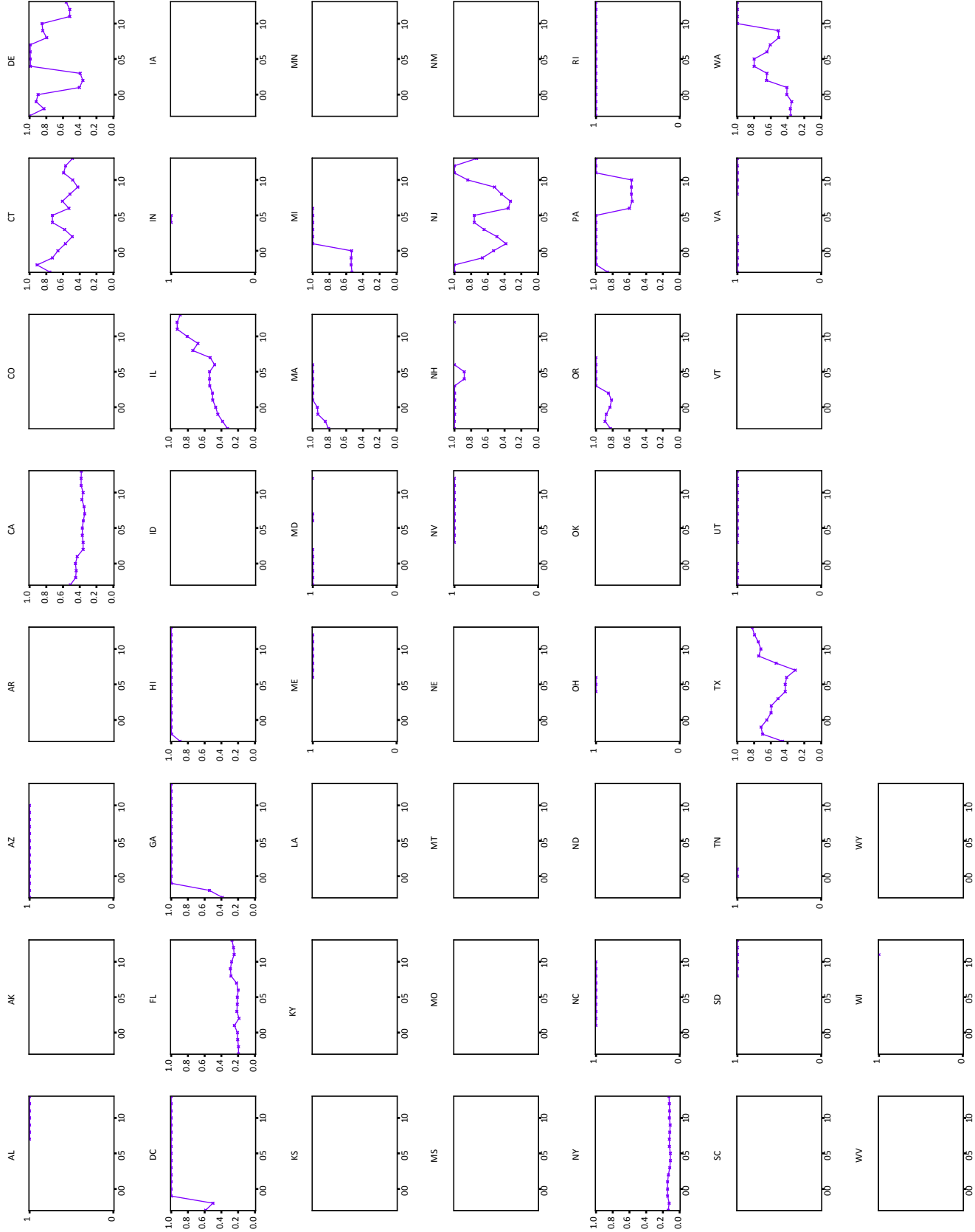
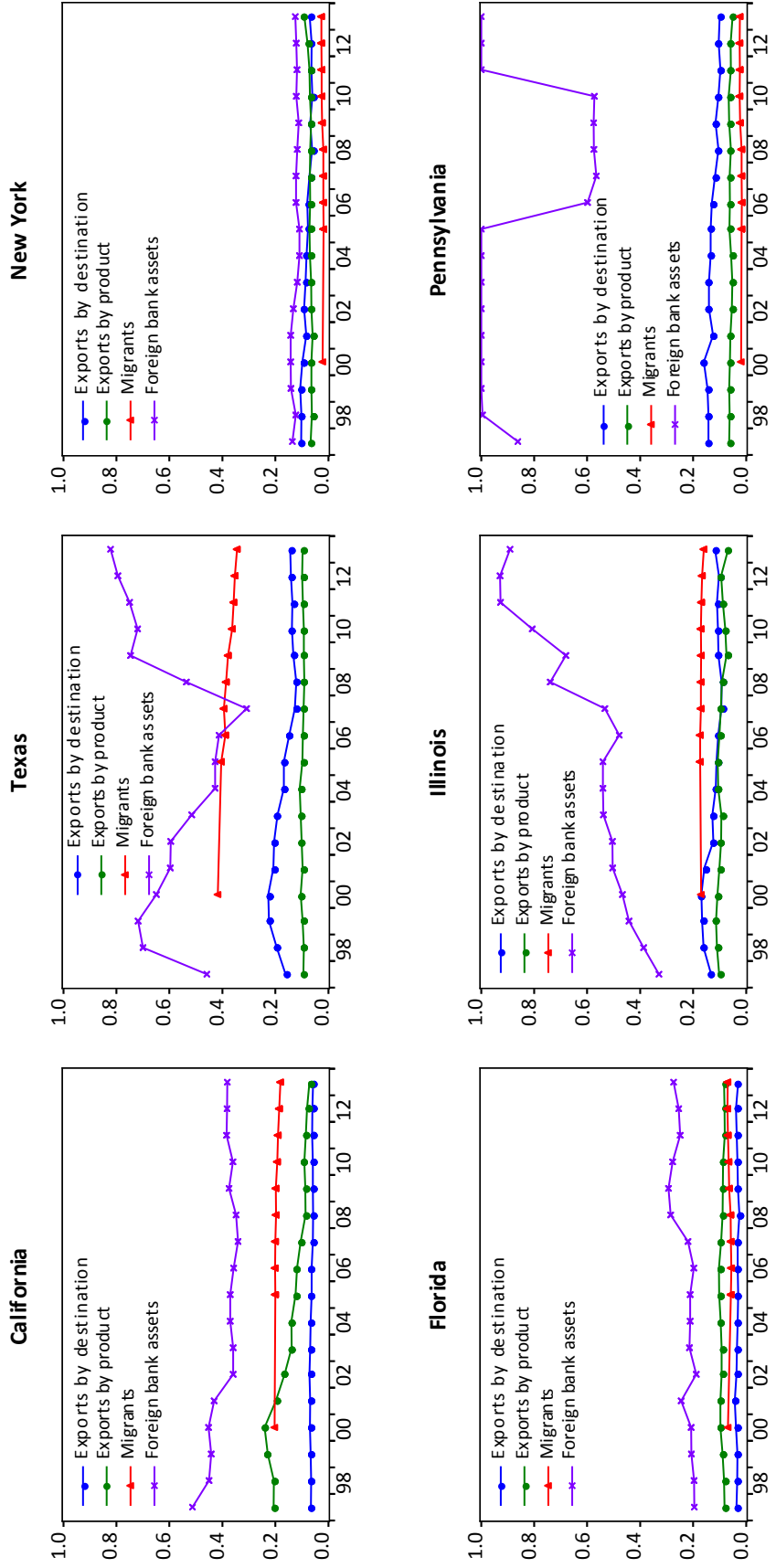Figure 5: Hirschman-Herfindahl Indexes for the 6 Largest U.S. States

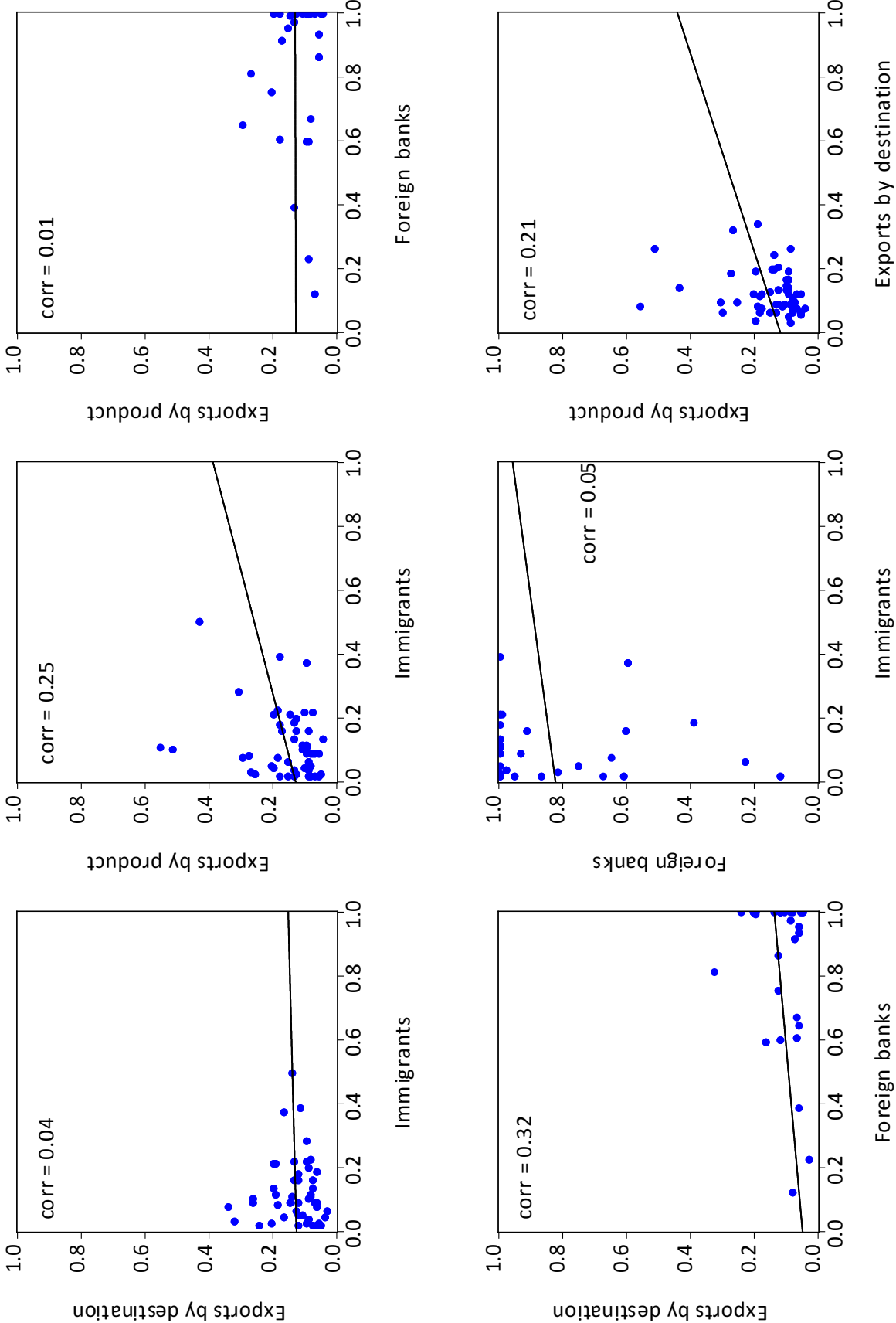Figure 6: Pairwise Correlations of Different Dimensions of Diversity

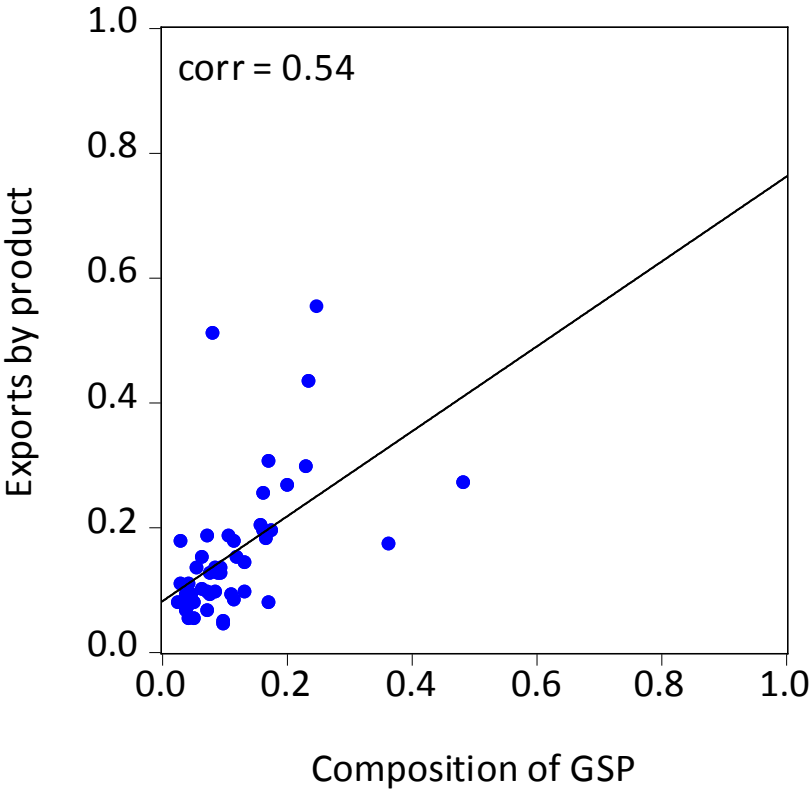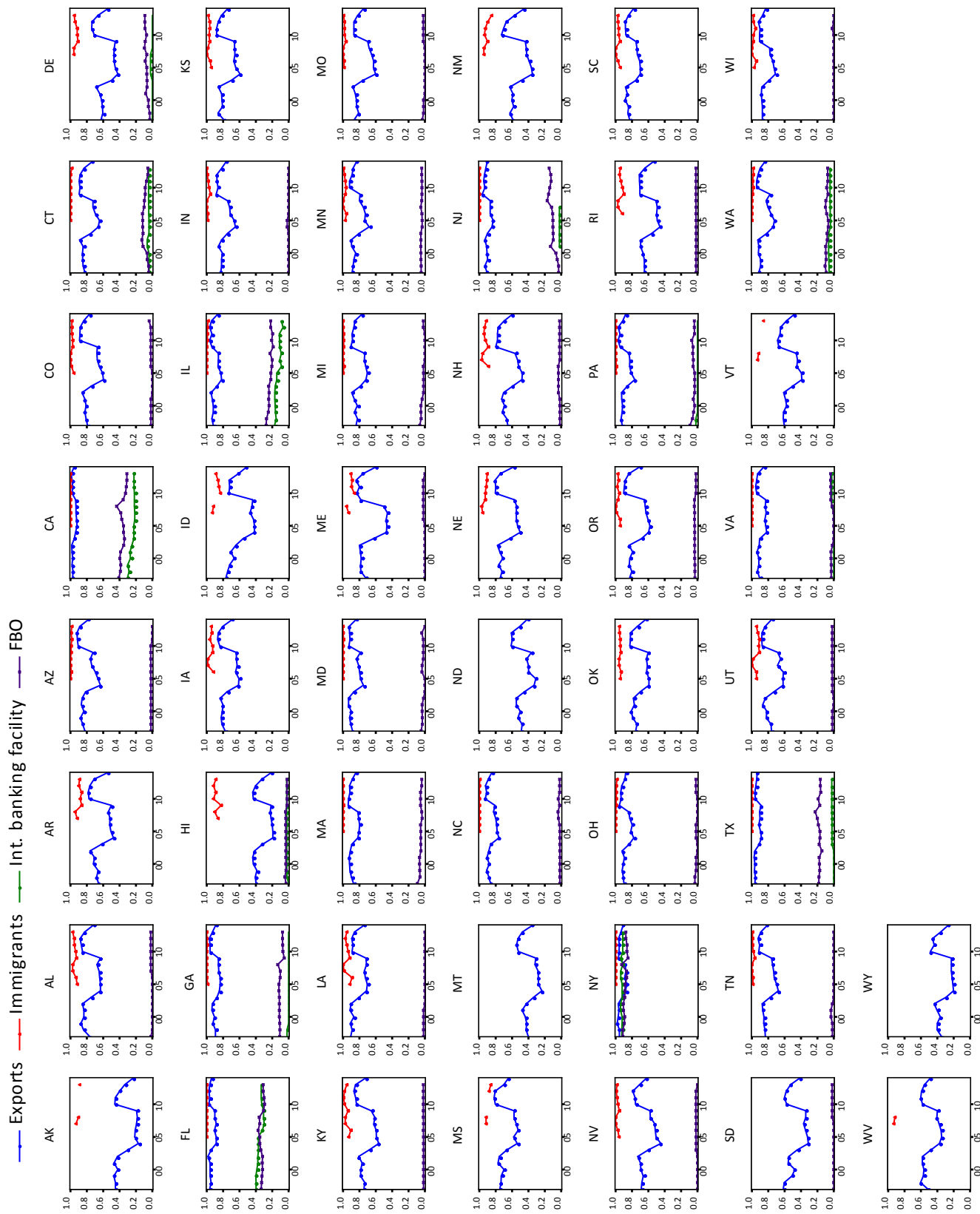**Figure 7: Hirschman-Herfindahl Index: Composition of GSP vs. Exports by Product**

Figure 8: Countries Represented in Each State as a Share of Total Countries Represented in the Nation

Legend: Exports — Immigrants — Int. banking facility — FBO

Appendix: Data sources and definitions

State Exports: U.S. states' data are available on an annual basis from 1997. Export flows by trading partners and by product for all 50 states and the District of Columbia are reported by the World Institute for Strategic Economic Research (WISER). We compute export weights based on export flows from each state to each trading partner using the following weighting scheme: $\phi_{c,s,t}^{x} = x_{c,s,t} / \sum_{c=1}^{C_t} x_{c,s,t}$, which shows the exports to country c as a share of the total exports of state s at date t.

Gross Domestic Product (GDP): Output for each country and global GDP data are from the International Monetary Fund's *World Economic Outlook* database.

Gross State Product (GSP) data are from the Bureau of Economic Analysis, which are available from 1997 onwards.

Immigration data: States' foreign-born immigrant data are from the American Community Survey (ACS) for the period 2005 to present. U.S. Census Bureau decennial survey data are used for the year 2000 and 1990. The ACS is sent to a small percentage of the U.S. population, and collects detailed information on the characteristics of U.S. population and housing. Since ACS data are collected every year, rather than once every ten years, they provide more current estimates throughout the decade. The Census Bureau expanded the ACS to full sample size for housing units in 2005. Estimates prior to 2005 are available but do not contain the level of detail needed for our analysis.

World population: Population data are from the United Nations' *World Population Prospects.*

Foreign banking entities: Data on foreign banking entities are from the Federal Reserve Board of Governors. These are reported quarterly and available from 1997. Data includes information on location of foreign financial institutions and type of institutions (i.e. whether it's a representative office with no assets or a branch with U.S. assets).

Real personal consumption expenditures per person (Per capita RPCE): Data on state-level RPCE is from U.S. Bureau of Economic Analysis. Per capita RPCE is computed by dividing RPCE for each state with the corresponding state population data.

Tax Burden: These are tax burdens imposed on residents by states. These are per-capita state taxes which include both state and local taxes reported by the U.S. Tax Foundation.

Expenditure on foreign travel by U.S. residents as a share of services PCE: Data on personal consumption expenditures are from the Bureau of Economic Analysis.

Expenditure in the U.S. by non-residents as a share of services PCE: Data on expenditures by non-U.S. residents are from the Bureau of Economic Analysis.

Diversity of state's production base: These data are the state's herfindahl indexes of each states' GSP. GSP data are from the Bureau of Economic Analysis.

Table 4: Export Categories Used in Measuring Export Diversification

	Exports by product (NAICS 3-digit Code)	Gross State Product by product (NAICS 3-digit code)	Consolidated category
1	Food (311)	Food, beverages and tobacco products	Food, beverages and tobacco products (311+312)
2	Beverages and tobacco (312)		
3	Textile mills (313)	Textile and textile product mills	Textile and textile product mills (313+314)
4	Textile product mills (314)		
5	Apparel (315)	Apparel, leather and allied products	Apparel, leather and allied products (315+316)
6	Leather and allied products (316)		
7	Wood products (321)	Wood products	Wood products
8	Paper (322)	Paper	Paper
9	Printing and related support activities (323)	Printing and related support activities	Printing and related support activities
10	Petroleum and coal products (324)	Petroleum and coal products	Petroleum and coal products
11	Chemicals (325)	Chemical products	Chemical products
12	Plastics and rubber products (326)	Plastics and rubber products	Plastics and rubber products
13	Nonmetallic mineral products (327)	Nonmetallic mineral products	Nonmetallic mineral products
14	Primary metals (331)	Primary metals	Primary metals
15	Fabricated metal products (332)	Fabricated metal products	Fabricated metal products
16	Machinery (333)	Machinery	Machinery
17	Computers and electronic products (334)	Computer and electronic products	Computer and electronic products
18	Electronic equipment, appliances and components (335)	Electrical equipment and appliance manufacturing	Electrical equipment and appliance manufacturing
19	Transportation equipment (336)	Motor vehicles, bodies, trailers and parts	Transportation equipment
		Other transportation equipment	
20	Furniture and related products (337)	Furniture and related products	Furniture and related products
21	Miscellaneous manufacturing (339)	Miscellaneous manufacturing	Miscellaneous manufacturing

Table 5: Summary of Descriptive Statistics for Data Used in Regression Analysis in Table 1

	Obs	Mean	Median	Min	Max	Std Dev
Diversity of Exports by Destination	900	0.129	0.106	0.025	0.631	0.079
Diversity of Exports by Product	900	0.159	0.120	0.039	0.825	0.121
Diversity of Foreign Bank Assets	361	0.775	0.999	0.109	1.000	0.292
Diversity of Foreign-born Population	471	0.124	0.090	0.015	0.530	0.110
Diversity of GSP-Production base	850	0.114	0.084	0.015	0.621	0.094
Real PCE per capita	900	30.911	30.328	19.141	43.995	4.729
Per capita state taxes	800	3.881	3.669	2.052	7.869	0.986
Expenditure in the U.S. by nonresidents as a share of services PCE	800	1.315	1.065	0.240	12.997	1.083
Expenditure on foreign travel by U.S. residents as a share of services PCE	800	2.065	0.639	0.111	62.218	6.521

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