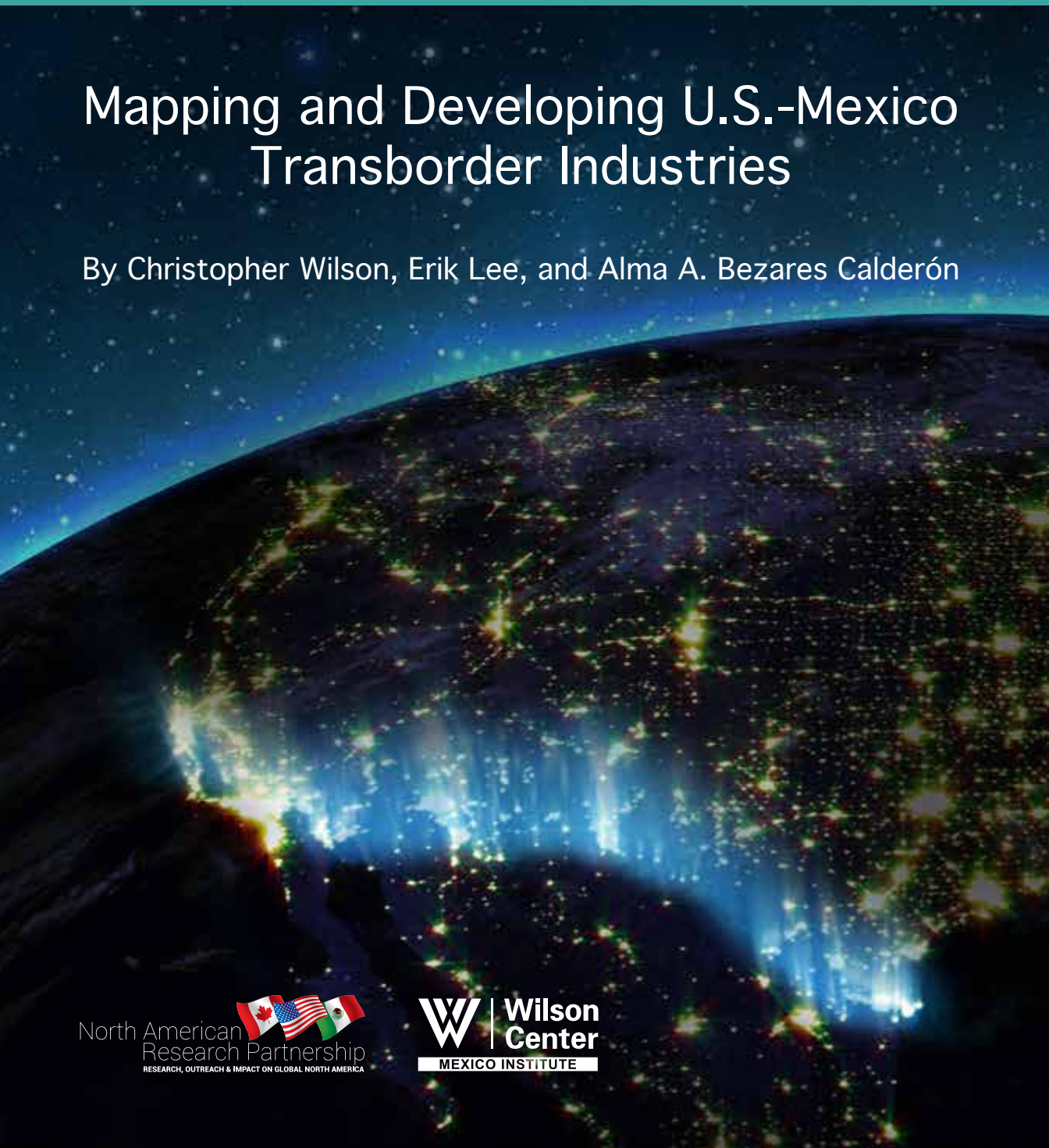
Competitive Border Communities

Mapping and Developing U.S.-Mexico Transborder Industries

By Christopher Wilson, Erik Lee, and Alma A. Bezares Calderón



North American Research Partnership
RESEARCH, OUTREACH & IMPACT ON GLOBAL NORTH AMERICA

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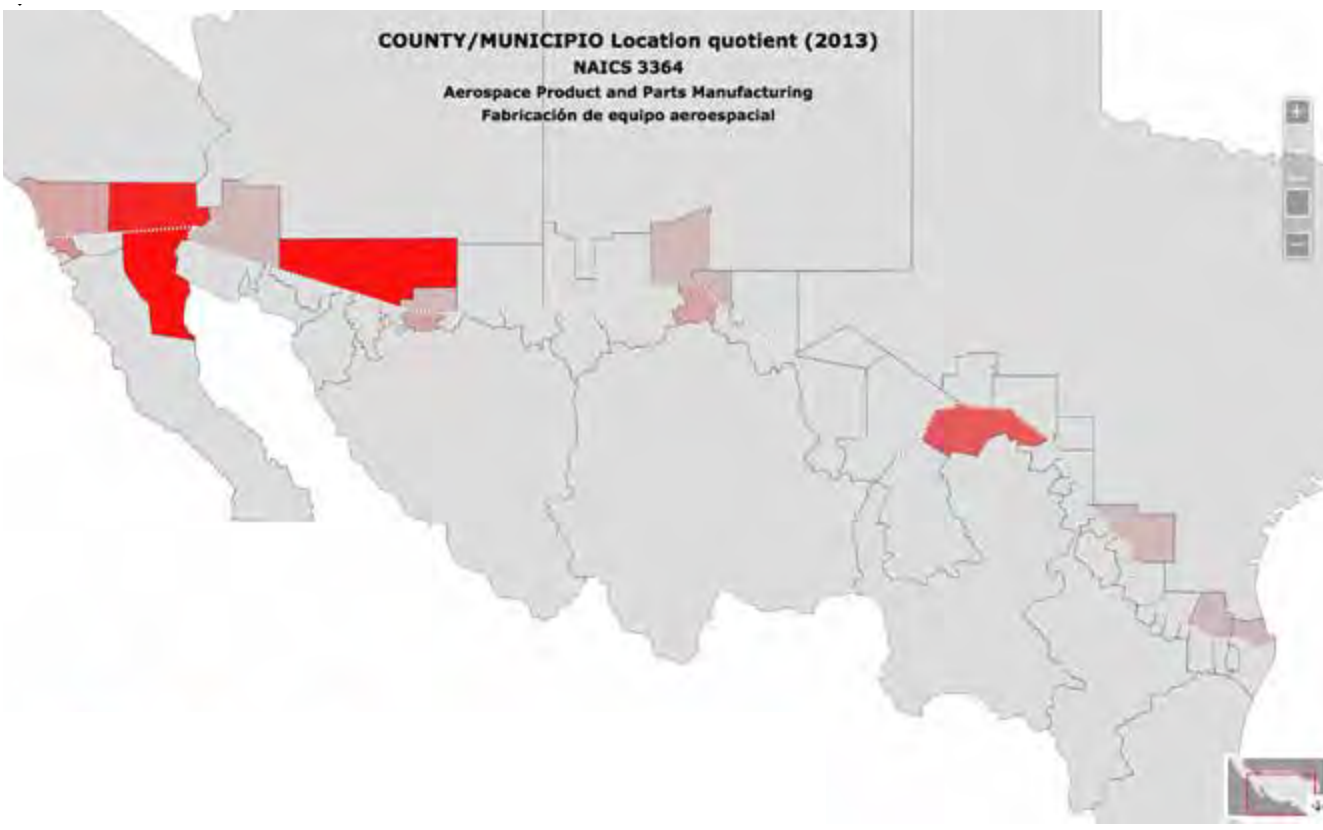

Introduction

Introduction

Since the implementation of NAFTA twenty-one years ago, trade between the United States and Mexico has grown six-fold. It now totals more than a half-trillion dollars each year, with approximately 80% of that, more than a billion dollars each day, crossing at the U.S.-Mexico land border. The enormity and dynamic nature of the commercial relationship has naturally garnered the attention of Washington and Mexico City, each realizing our competitiveness and growth have become intricately linked. Even as the terrorist attacks of September 11th, 2001 caused a marked increase in border security, the U.S.-Mexico economic agenda has, until recently, been almost entirely focused on mitigating barriers to trade, whether in the form of tariff reductions, border infrastructure investments, or the development of trusted-trader programs. The results have, in many ways, been impressive. More than six million U.S. jobs—and probably an even greater number of Mexican jobs—now depend on bilateral trade.

Yet the economic vision of the border embedded in such a trade-facilitation approach can be limiting. The border essentially becomes little more than a point of friction in an otherwise seamless binational economy. Border communities aspire to be more than a node on a transportation network, more than what many of them have titled a "pass-through economy," one in which too little value is added locally to the billions of dollars of commerce passing through its corridors each year.

Embracing their binational nature, border communities surely do seek to be connected, and as such, efficient transportation networks remain a vitally important dimension of economic development. But the aspiration to add value, to create jobs and strengthen quality of life demands more. It demands an integrated, binational approach to economic development, which involves a partnership among the business community; educational institutions; and the local, state and federal governments on both sides of the border. With binational economic development as the goal, the U.S.-Mexico border becomes not so much an obstacle as an opportunity. In fact, the very unevenness of development and the multiple jurisdictional boundaries that are regularly understood as challenges to economic development in the region are also the keys to its advance. The linguistic, cultural and economic diversity within border communities provide them with a collection of assets unmatched anyplace else in the world and allow them to articulate a unique value proposition and strong case to attract industries looking for a place to invest.

This study is rooted in such a vision and seeks to identify opportunities for binational cluster-based economic development. Using comparable data available in both nations, we have divided the border into five binational subregions and for each identified industries that are concentrated, dynamic, and — when possible — binational. (The methodology

is described briefly later in the introduction and in detail in Appendix A.) The data alone, however, cannot tell the full story. For that reason, we convened a series of five focus groups, one in each of the binational subregions that we looked at, to help us analyze our results and assess current and potential efforts to cooperatively develop key binational industries along the U.S.-Mexico border.

A confluence of factors has made this an opportune time to complete an effort of this nature. The federal-level U.S.-Mexico economic agenda has in recent years focused an increasing and important level of attention on non-trade related economic development issues. Among the new initiatives are the Mexico-United States Entrepreneurship and Innovation Council (MUSEIC), the Bilateral Forum on Higher Education, Innovation and Research (known as FOBESII for its acronym in Spanish), and, as a cabinet level coordinating mechanism for these and other efforts, the U.S.-Mexico High Level Economic Dialogue (HLED). Through these initiatives, the federal governments are seeking not only to lower transaction costs in the regional economy but are helping build human capital and strengthen the business environment so that new ideas can be generated and transformed into new businesses and jobs. We are transitioning from an era of facilitation to one of creation.

At the same time, binational economic development efforts in the border region have gained renewed energy. New organizations, like the CaliBaja Mega Region, the Borderplex Alliance in the Paso del Norte region, the AriSon Mega Region, and BiNED in the Lower Rio Grande Valley, are joining others that have been working to strengthen binational ties for years, and in some cases, even decades. These groups seek to transition the border economy from one of low-cost, low-skill assembly and services to one driven by innovation and advanced manufacturing. Their efforts have become more inclusive, cooperative and binational in recent years, replacing competitive approaches with projects to jointly strengthen multi-jurisdictional local communities.

We aim to support these developments with the generation of new data to better understand the binational economy and an analysis of how the state of the art in cluster-based economic development could be applied in the context of binational border communities.

Regional Overview

From an economic standpoint, the enormous U.S.-Mexico border region, defined for this study as economic activity taking place in the counties and *municipios* on the international border, is characterized by sister-city pairs engaged in a long-term process of forming five "mega-regions" whose principal economic pillars include large-scale joint production and advanced manufacturing, among other activities. These regions include the CaliBaja Mega Region and El Paso/Las Cruces/Ciudad Juárez' "BorderPlex" with their advanced

crossborder manufacturing platforms and rapidly expanding local infrastructure. They also include the Arizona-Sonora region's produce- and manufacturing-driven border economy; Laredo, McAllen and Brownsville and nearby cities in Coahuila, Nuevo León and Tamaulipas which link Texas and the industrialized Midwest and Northeast with Mexico's industrialized eastern corridor; and numerous small- and medium-sized cities and towns as well as some of the most rural and underdeveloped areas in North America. In a previous report, *The U.S.-Mexico Border Economy in Transition* (2015), we detailed changes in border region institutions, economic development efforts, ports of entry infrastructure, human capital and the energy industry and gave specific recommendations that in sum could point the way toward greater prosperity in the region in the medium-term.

Economic and business leaders in both nations often think of the area as a transit point, and this viewpoint is to some extent correct. With certain exceptions, and despite the fact that northern Mexico is more industrialized and has less poverty than the south of the country, poverty remains a significant challenge for towns, cities, and rural areas along both sides of the border. Much of the economic development conversation in border communities revolves around land ports of entry, how they are staffed, how many lanes they have, how quickly or slowly they process border crossers. These border crossings are critically important nodes in a broader North American commercial network, linking long supply chains connecting the industrialized Midwest and Northeast with manufacturing centers not only in the border region but also central Mexico that in aggregate form the backbone of the North American economy.

Yet while the region has done much to knit together the North American economy as a whole, in many places of the border, work is just now beginning in earnest to peer deeply into the various *local* economies and find value in the interrelationships between businesses, universities and government in the border region in order to build more robust economies. This work is critically important as it will allow local, state and federal economic decision makers the ability to more effectively visualize the economic challenges and opportunities facing the region. This in turn can provide a better understanding of what it will take to build stronger local economies in border communities, stronger border mega-regions and a more competitive North America as a whole.

Five Binational Subregions of the U.S.-Mexico Border Analyzed in this Report

1. **The California-Baja California Border Subregion**
2. **The Arizona-Sonora Border Subregion**
3. **The Paso del Norte Subregion**
4. **Coahuila-Nuevo León-Tamaulipas-Texas Border Subregion**
5. **Lower Rio Grande Valley -Tamaulipas Subregion**

Project Overview

This project involved three major components. The first was a review of current thinking and research efforts on clusters and cluster-based economic development, looking in particular to identify approaches to understand and promote the development of industrial clusters in a transborder context. The second component involved the actual mapping of crossborder industries, using compatible data on both sides of the border to measure the extent to which industries in the border region are concentrated, dynamic, and binational. To visualize this data and allow interested parties to dive deeper into each of the border counties, *municipios* and binational subregions, we developed a web-based mapping tool (see naresearchpartnership.org/projects/binationalindustries/map and https://wilsoncenter.org/special-initiatives/binationalindustries). The third component involved a series of binational focus groups held during June 2015 in San Diego, California; Tucson, Arizona; El Paso, Texas; Laredo, Texas; and Brownsville, Texas, which allowed us to gain additional insight into the workings of the border economy and to identify opportunities for cross-border, cluster-based economic development efforts. We outline these three components in further detail below and present the principal findings from steps two and three at the subregional level throughout the following chapters of this report.

Component 1: Current Thinking on Cluster-Based Economic Development

Approaches to economic development span a wide range of highly contested intellectual terrain, ranging from *laissez faire* economic theory to more hands-on approaches that at times have been termed industrial policy, in which government plays a significant role in managing the economy. Cluster-based approaches fall somewhere in between these two extremes. They require significant collaboration between the private sector, government, and educational institutions, and they involve the promotion of specific industry groups, so they certainly are not *laissez faire*. However, cluster-based strategies do not "pick winners" in the sense of subsidizing or advantaging individual firms; rather they seek to enhance competition among firms by collaboratively enhancing the business environment in ways that attract new investments and entrepreneurs. In its revamped definition of economic development, the U.S. Economic Development Administration emphasizes the need for "effective, collaborative institutions focused on advancing mutual gain for the public and private sector."[1] This section draws significantly from the work of Harvard University's Michael Porter and Christian Ketels, seeking to apply their ideas to the U.S.-Mexico border context (See Appendix C for additional sources).

The Great Recession brought new urgency to economic development work, and that was particularly true of the U.S.-Mexico border region, which had been buffeted by various

1 U.S. Economic Development Administration, www.eda.gov.

factors in addition to the Great Recession, including the post-9/11 expansion of border security; China's expanding role in global manufacturing; and acute security issues in communities such as Tijuana and Ciudad Juárez.

To boost local, national and regional economies, as is the case in other regions of North America and the rest of the world, economic development stakeholders are in the process of gaining a better understanding of clusters and effective strategies to foster their development. Clusters are created over time by market forces, not political will. As such, cluster-based development is based on a process of identifying (with hard data) already existing competitive strengths and only then assessing whether collaborative efforts on the part of the cluster participants might be useful. Efforts by government to dream up and kick-start the next best industry have a rate of failure found to be unacceptable by taxpayers. Cluster-based approaches therefore reveal existing industrial clusters with roots in local economies that can be further cultivated via a variety of strategies (see box), each rooted in the reasons that clusters form in the first place.

Businesses cluster for a variety of reasons. They can find cheaper access to a wide range of inputs because the resulting economy of scale incentivizes the creation of specialized and ultra-efficient supply chains. The concentration of employers helps attract and train a specialized workforce suited to the needs of the industry. Universities, community colleges, and training centers

Examples of cluster-enhancing strategies

- Corporate philanthropy to improve the business/social environment
- Trade associations sharing costs (training facilities, some infrastructure investments, etc.)
- Courses for managers on regulatory affairs and best practices in the industry
- Create industry-based groups/ trade associations
- Create testing and standards infrastructure and organizations
- Government-business dialogue on regulation of industry
- Businesses and trade groups work with local universities and technical schools to develop curricula
- Create university research centers and jointly fund research
- Support development of supplying industries and customer industries, strengthening the cluster-linkages across industries
- Joint marketing by trade associations
- Joint procurement
- Supporting focused scholarships to strengthen workforce and research/design/innovation capacity of the region

often develop targeted programs to further strengthen human capital development. Businesses also cluster in order to take advantage of (and in many cases drive the construction of) shared resources—scientific, physical infrastructure, informational infrastructure, natural resources, regulatory environment, etc. Finally, they might cluster in order to meet a large or specialized local or regional demand or even to capitalize on existing complimentary industries. When clusters do form, they tend to drive not only improved productivity but also innovation, which research suggests occurs most when researchers, inventers and entrepreneurs come in frequent contact with others within and among those categories.

Three large-scale, and in some ways competing, economic trends form the backdrop of the development of cluster-based economic development. They include globalization, a megatrend that involves stretching supply chains out across the world. One might think that globalization and the improvements in transportation and telecommunication technology that are driving it would make clustering unnecessary and obsolete. Interestingly, to the contrary, the fragmentation of discrete portions of manufacturing processes have allowed for ever-greater specialization. At the same time, the move away from an in-house lab model of innovation to the co-creation of new products in partnership with supplier networks has actually opened up the increased importance of geographically clustered innovation networks. In short, despite globalization, the second trend, agglomeration (or clustering), is alive and well. A third trend, variously termed "regionalization," "reshoring," or "nearshoring" is located somewhere in between globalization and agglomeration, focusing on shortening supply chains in order to minimize risk, transportation costs, and especially time to market. This last trend is creating important opportunities for industrial growth in North America, and the U.S.-Mexico border region is uniquely placed to take advantage of it.

What is a Cluster?

"Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (e.g., universities, standards agencies, trade associations) in a particular field that compete but also cooperate." Michael Porter*

**Location, Competition, and Economic Development: Local Clusters in a Global Economy," Economic Development Quarterly, 2000, 14, 15.*

Component 2: Binational Industry Mapping

In order to identify and measure important industrial and business clusters, a series of quantitative tools have been developed that fall under the concept of cluster mapping. In the United States, the U.S. Department of Commerce has an ongoing partnership with

Harvard University to map clusters throughout the nation. They describe cluster mapping as a tool to identify groups of industries or "clusters" in a given geographical area utilizing "a standardized set of benchmark cluster definitions that group individual industries uniquely into cluster categories."[2] Identifying clusters is a way to identify a region's competitive advantages, which suggest areas of opportunity for economic development. In Mexico, there have also been important cluster mapping efforts, especially those developed by the Tecnológico de Monterrey (ITESM) and its Institute for Regional Development.[3]

While the field of cluster mapping is at this point well developed, its application to multinational transborder regions is not. Anyone who has lived or worked in the U.S.-Mexico border region knows that the local economy does not stop at (and is often driven by) the border, but there are significant challenges associated with measuring it: conceptual, methodological, and especially those based on uneven and at times incompatible data across the border. It may be a new and challenging area of inquiry, but it is an active one. Under the leadership of the U.S.-Mexico High Level Economic Dialogue (HLED), the Mexico-U.S. Entrepreneurship and Innovation Council (MUSEIC) and its iCluster Subcommittee have (in partnership with researchers based at ITESM, Harvard, UCSD, COLEF, CaliBaja, SANDAG, INEGI, and the EDA, among others) launched two major transborder cluster mapping projects, focused on the CaliBaja mega-region and the Monterrey/Saltillo/Texas corridor.

Our analysis aims to complement these ongoing efforts by providing a border-wide analysis of transborder industries. Importantly, our analysis is better understood as industry mapping, rather than cluster mapping.[4] We have developed a unique methodology that harnesses some of the basic research tools of cluster mapping and economic competitiveness to identify

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2 http://clustermapping.us/content/cluster-mapping-methodology

3 It is important to note that though the concepts being employed are quite similar, the methodologies that have been developed in each country differ, as does the availability of data. For example, U.S. approaches have tended to use employment-based data to identify clusters; Mexican researchers have worried that such an approach would not identify the types of higher value-added but perhaps less labor intensive industries that they seek to develop.

4 One of the main challenges associated with binational cluster mapping is gaining a clear understanding of how firms interact across an international boundary. Trade data can help, but it lacks detail. To do cross-border cluster mapping, one must develop (or replace) a cross-border input-output matrix, a costly and challenging task being contemplated by some of the aforementioned efforts. Instead of following this path, our methodology maps industries (by North American Industry Classification System, or NAICS, code) with a presence on both sides of the border. As mentioned above, we focus solely on the counties and *municipios* directly on the U.S.-Mexico border. This has advantages and disadvantages. We chose to limit our research to these areas because the goal of the research is to ultimately promote economic development in the border communities themselves and because this provided a methodological consistency throughout the border region that allows a certain level of comparison across subregions. Studies that include major urban areas such as Monterrey or Phoenix would lose some of the border-community focus but gain consideration of additional important economic assets that could be leveraged. Defining cluster boundaries is as much art as it is science.

border industries that are **concentrated, dynamic, and binational**. We believe that industries that meet these three criteria would be good potential candidates for cluster-based economic development strategies, and the results of our quantitative analysis of the border subregions should be understood as this: results that identify strong potential candidates for further cross-border economic development efforts. There are additional factors, such as the willingness of the local stakeholders to actively engage in such an effort, that we cannot measure yet which are important to consider in the process of targeting clusters for development efforts. A brief description of the data sources and methodology follow, but for more detail see appendices A, B, and C.

In the study, two data sources for employment in Mexico and the United States were used: the Economic Census 2009 and 2014, published by INEGI and the County Business Patterns Series 2009 and 2013, a yearly publication of the United States Census Bureau. Regarding industries' trade and output, we used data from the Bureau of Economic Analysis to get GDP by subsector for the U.S. states; the Census Bureau's USA Trade Online tool to obtain state imports and exports from Mexico; and we relied again on INEGI to obtain data on GDP and trade by subsector for the Mexican states.

In terms of methodology, we first measure industry concentration by calculating each industry's location quotient, or LQ. This creates a comparison between the level of local concentration of jobs in a particular industry and the number of jobs in that industry at the broader national (or in the case of the subregions binational) economy. Our application of LQ analysis to binational border economies is similar to the approach developed by the CaliBaja Research Initiative (see additional sources in Appendix B). A number greater than one signifies a higher than average level of concentration. High levels of concentration are associated with agglomeration and/or clustering, which, for the reasons discussed above, is associated with a high degree of competitiveness.

An industry need not be large to generate a high LQ, just larger locally than it is elsewhere. It does, however, identify industries that have already gained prominence in the regional economy. In order to capture some of these currently less concentrated but quickly growing industries (and to identify those that are both concentrated and fast-growing), we utilized a measure of **dynamism**. A dynamic industry, according to our definition, is one that is growing faster locally than it is in the broader national or binational economy.[5] Faster than average growth is another way to identify industries that have a higher degree of competitiveness in a regional economy, as they are outperforming their peers in other locales. In the case of our analysis, we look at jobs-added as the measure of industry growth. To the extent that an industry that has a higher rate of job creation (in our case between 2009 and 2013) within the region than in the broader economy, it will have a higher score in what is traditionally described as a "competitiveness

5 The calculation is one of the components of a shift-share analysis.

index" and which we can understand as a measure of dynamism.

Finally, and taking into consideration the significant data limitation involved in doing so, we sought to measure the extent to which industries were doing business across the border. In seeking to target industries for crossborder economic development, we wanted to identify those that are already involved in crossborder commerce, which would suggest they were a part of regional supply chains and/or served a binational market. In general, the opportunity for collaborative crossborder economic development would be strongest when crossborder ties already exist. Using state-level trade data, we calculated the U.S.-Mexico export intensity of broad industry categories for each U.S. and Mexican border state, dividing exports to the United States or Mexico by the state-level product (GDP) of the industry. These two figures come from very different data sources, which at times caused issues, but we were nonetheless able to gain interesting insight into the extent to which industries were involved in **binational** economic activity.

To allow a deeper and more visual exploration of the results of the quantitative dimension of this study than this brief report allows, the research team worked with an experienced data expert from the CaliBaja region to create an interactive web-based mapping tool that is integrated into the websites of both the North American Research Partnership as well as the Mexico Institute. The map focuses on Location Quotient data for two time periods (2009, 2013), spanning 339 4-digit NAICS code definitions and covering both the 75 individual counties/municipios touching the border and amalgamated for the 5 border sub regions. The site can be accessed at https://wilsoncenter.org/special-initiatives/binationalindustries and naresearchpartnership.org/projects/binationalindustries/map.

Component 3: Binational Focus Groups

During June 2015, the North American Research Partnership and the Mexico Institute conducted a series of five focus groups with border region economic development experts and industry representatives. The sessions were hosted by a variety of public, private, and academic entities and included a broad cross-section of stakeholders, including cluster representatives, chambers of commerce, city and county governments, mega-regions, universities, U.S. and Mexican consulates, and economic development organizations. In these sessions, the research team presented findings from the cluster mapping research and worked through the interpretation of the data with local experts, getting their feedback and ideas on strategic directions for economic development and competitiveness as stimulated by the cluster mapping research. Three principal questions guided the focus groups:

1. How do you understand connections/supply chains within the region and especially across the border? How organized are businesses, sectors, and economic development groups across the border?

2. What are the principal obstacles to growth and greater cross-border organization?

3. How can government, the business community, and educational institutions partner to promote the development of key local industrial clusters?

Approximately 200 stakeholders participated in the five focus groups. The research team is in the process of working with stakeholder organizations to bring together diverse economic development organizations along the U.S.-Mexico border to enhance professional relationships and share best practices with respect to research and advocacy efforts.

The team also conducted supplementary interviews throughout summer 2015 with practitioners from the business community, government, and workforce development/education.

U.S. Consul General in Tijuana Andrew Erickson and Mexican Consul General in San Diego, Remedios Gómez Arnau address the Cali-Baja Industry Mapping Focus Group, San Diego, California, June 22, 2015.

Congressman Beto O'Rourke joined the U.S.-Mexico Border Industry Mapping Focus Group in El Paso, Texas, June 26, 2015.

2015 U.S.-Mexico Border Industry Mapping Focus Groups

Date	Site	Host
June 22, 2015	San Diego, California	CaliBaja Mega Region
June 24, 2015	Tucson, Arizona	Consulate of Mexico in Tucson
June 26, 2015	El Paso, Texas	BorderPlex Alliance
June 29, 2015	Laredo, Texas	Binational Center, Texas A&M International University
June 30, 2015	Brownsville, Texas	United Brownsville

The value of receiving input and ideas directly from those most familiar with the challenges and opportunities present in their local community cannot be overstated. The data alone is insufficient.

The project also speaks to specific, recent initiatives related to binational economic development in the U.S.-Mexico border region. One of these is the U.S.-Mexico High Level Economic Dialogue's 2015 commitment to deepen "stakeholder engagement," that is, a sustained dialogue with key organizations and individuals who are intimately involved in crossborder economic development activities in the public-, private-, and non-governmental sectors. For a region so far from the national capitals and so dependent on policies developed there, this was an important and positive development for the border region. Indeed, while working in the border region during 2014, we found stakeholders had a strong desire to engage the HLED but little information regarding how to do so.

The two governments' joint January 6, 2015 HLED statement lays out the basic ideas behind this engagement with local stakeholders:

> "Outreach and stakeholder engagement remain fundamental components of the HLED and one of its most innovative aspects. We carefully consider the input and opinions of all of our stakeholders in formulating the goals of our Economic Dialogue. The government officials most involved with the HLED have also held several meetings with members of the private and academic sectors to get feedback on what they consider fundamental to making North America the most competitive and dynamic region. Ensuring this close dialogue remains will not only bring effectiveness and legitimacy to our joint work, but will also ensure it remains relevant, dynamic, pragmatic and appropriately focused. We are convinced that these must remain part of our joint agenda, if we are to deliver a more competitive and stronger North America.[6]

6 The White House, Office of the Press Secretary, "Joint Statement: U.S.-Mexico High-Level Economic Dialogue," January 6, 2015. http://www.whitehouse.gov/the-press-office/2015/01/06/joint-statement-united-states-mexico-high-level-economic-dialogue.

Report Organization

The report has five chapters, one per subregion, that present the most important findings of the study.

Each of the five chapters contain a discussion of challenges and opportunities facing the individual subregions, integrating a detailed quantitative analysis of industry development with the stakeholder feedback from the focus groups. Three key variables—industry concentration, dynamism, and binational orientation—are analyzed.

Bringing these three components together, we believe, results in a more complete picture of border region industry as well as challenges and opportunities for the two federal governments.

Border-wide Findings

Given that the primary purpose of this study is to identify and map transborder groupings of firms in each of the five subregions that share assets and could, with the proper organization and support, serve as important sources of growth and improved economic competitiveness, the most important results of the study are at the subregional level. These findings and related analysis are found in the following chapters.

Nonetheless, through the process of analyzing industry development along the border, we arrived at some conclusions with relevance for the entire U.S.-Mexico border region.

As mentioned above, we departed from the premise that economies do not stop at international borders. This assumption was in many ways validated, but in other important ways challenged. We found, as has been well documented previously, the development of highly specialized manufacturing industries on the Mexican side of the border designed to take advantage of their close proximity to the U.S. market. On the U.S. side of the border, we found strong logistics industries designed to serve the huge volume of binational trade. We also found several industries with high levels of exports to Mexico, but **we found fewer signs of deep supply chain connections or non-logistics service provision by U.S. firms along the border to Mexican border industries than we had expected.** This runs in stark contrast to previous work we have undertaken looking at the depths of supply chain linkages and manufacturing integration between the United States and Mexico as a whole,[7] but it has historical roots. When Mexico instituted the Border Industrialization (or *Maquiladora*) Program in the 1960s, there was an expectation that a twin-plant model, with factories on each side of the border jointly developing a product, would develop. Maquiladoras quickly sprouted up on the Mexican side of the border, but barring a few

7 Christopher Wilson, *Working Together: Economic Ties Between the United States and Mexico*, Washington DC: Wilson Center, 2011.

exceptions, the U.S. factories working in co-production with their Mexican counterparts never felt the need to move their work to the border region—they continued production in Ohio, Michigan, or wherever they were, choosing instead to simply truck parts back and forth from the border factories.

This shows that the border does matter—it acts as a barrier to economic activities—but it is far from insurmountable, in terms of both trade and binational economic development. **The key lesson, then, is that border communities will only have truly integrated, and as a result more competitive, binational economies if they choose to build them.** Building such crossborder connections is therefore a key task of local government, industry, economic development groups, and educational institutions.

"The key lesson, then, is that border communities will only have truly integrated, and as a result more competitive, binational economies if they choose to build them."

Another important finding from the exercise is the highly uneven nature of cluster organization and crossborder economic development efforts throughout the border region. Cluster-based organizations in the border region tend to be domestically (rather than binationally) oriented—they were especially well developed in states such as Nuevo León, but less so in others, particularly on the U.S. side of the border. In terms of broader crossborder economic development efforts, some regions, such as the CaliBaja Mega Region, exhibit advanced organization, while others are behind the curve and require significantly increased coordination to effectively leverage assets on both sides of the border.

There are numerous reasons for this uneven development. The border region's sheer distance from state and national capitals affects its ability to secure political support as well as key resources for economic development project seed capital. As many observers have noted, the predominance of border security over trade has affected the overall business environment at the border. In addition, while state economic development agencies often formally name industry clusters in Mexico, they are handled in a more decentralized fashion in the United States. This fact—as well as the highly uneven distribution of advanced manufacturing operations, with a preponderance of these operations on the Mexican side of the border—poses a challenge for the cultivation of binational clusters. Ongoing inter-organizational competition for scarce resources and recognition can also inhibit critically important regional collaboration. And finally, chronic poverty and the related challenges in human capital formation affect the development of robust clusters.

Crossborder mobility and human capital development continues to be a challenge in the region. Visa regulations and university system prohibitions on faculty, staff and student

travel to Mexico tend to work against the development of robust human capital formation in the region. This was an obstacle consistently identified at the focus groups.

Even given these challenges, there is great energy throughout the region for new forms of collaboration and to strengthen engagement with federal and state authorities to build partnerships and bring attention to crossborder economic challenges and opportunities.

Principal Recommendations

Cross-cutting major recommendations include:

1. **The United States and Mexican federal governments must play an especially important role in cross-border economic development efforts.** Given the fact that border economies have an international boundary running through the middle of them, stakeholder engagement efforts that build partnerships between federal agencies and local communities are invaluable in this process. U.S. and Mexican consulates can serve an expanded facilitating role in these cross-border economic development efforts.

2. **Border communities should actively utilize cluster-based economic development, with its focus on collaboration among government, industry and educational institutions, as an opportunity to engage federal officials managing the border as partners in a joint effort.** Too often, outreach efforts by border officials can be summed up as a process of receiving complaints from the local community.

3. **Link up economic development organizations along the border through a variety of formal and informal mechanisms.** As noted in previous work, the U.S.-Mexico border region is an enormous geographic space; this has, over time, served to make border-wide communication difficult. An annual meeting of border region economic development professionals and a robust online directory of individuals and organizations working in the field are two practical steps toward the sharing of best practices as well as addressing shared challenges and opportunities that could over time greatly enhance the capacity and awareness in the area. An annual advocacy day in each of the national capitals might also strengthen coordination among border communities while clearly communicating to federal officials that there are commonalities (albeit also differences) among the needs of the border subregions.

4. **Minimize crossborder travel restrictions for university faculty, staff and students.** University systems' restrictions on faculty, staff and student welfare too often fail to reflect the actual risk inherent in crossborder travel. These concerns need to be weighed against their potential to hinder development of key faculty and student contacts, professional development, intercultural competency, and language skills; as well as

the development of innovation ecosystems that are critically important to cluster development. University systems, state governments, and the U.S. Department of State (which issues travel warnings) must all work together to overcome this challenge and to lessen the formidible administrative costs associated with bringing students and workers across the border for even short-term student exchanges and internships. We found some border universities resistant to processing the substantial paperwork required in case of less-than-semester-long programs..

5. **The two federal governments need to further harmonize (and localize) data collection across the border.** This would allow better analysis of the crossborder economies of the southwest United States and northern Mexico, and it would improve the ability of border communities to communicate to potential investors their full range of assets and market size.

6. **Update and streamline specialist, worker and student internship NAFTA visas to foster mobility.** The NAFTA visa continues to be underutilized but could play a key role in building robust binational industry clusters. Firms and universities that want to develop internship programs utilizing the new binational Memorandum of Understanding on internships could benefit from a more useful NAFTA visa.

7. **Create binational cluster councils with public, private and education sectors all at the table.** Clusters need some level of organization in order to successfully employ cluster-based economic development strategies. This includes organization within a cluster or industry group and, potentially also the creation of a broader platform, or cluster council, through which the private sector, governments and universities pursue strategies to foster the development of a number of key industries (similar to the organizational structure currently used in Nuevo León). Creating binational cluster councils could foment the coming together of industry leaders and related cluster participants to create cluster-specific groups.

8. **Mega regions should monitor the growth of emerging binational industries that could be good candidates for cluster-based economic development.** A number of small industries—while not yet major employers— performed well enough between 2009 and 2013 in terms of percentage employment growth to warrant ongoing attention from mega regions. Subregional economic development organizations and government should keep close track of such emerging and dynamic industries, engaging them and exploring what they (the industry, not the individual companies) need to foster further growth.

Map of the concentration (LQ) of audio visual equipment manufacturing in the U.S.-Mexico border region, 2013.

Chapter 1

The California-Baja California Border Subregion

Overview

The California-Baja California border economy is surging forward in various areas and setting the stage for an array of future crossborder economic activity. Large-scale infrastructure improvements (including a $741 million renovation of the San Ysidro Port of Entry, a unique crossborder air terminal and a new port of entry due to begin construction in 2017, Otay Mesa East) are the most visible aspects of these developments. In addition, a history of innovation across numerous industries in the state of California; a large, diverse local economy; the sheer scale of crossborder human mobility, particularly at San Ysidro Port of Entry; successive waves of crossborder advanced manufacturing development and even an urban/civic renaissance in Tijuana have put this region in the forefront of crossborder economic development. Even given this impressive level of development, there is much binational work still to do in the region. This makes it an especially important experiment in potential binational cross-border cluster-based economic development.

The California counties of San Diego and Imperial together with the Baja California *municipios* of Tijuana, Tecate and Mexicali comprise the focus for this chapter. The area's large population (approximately six million inhabitants) is clearly an asset for economic development. While Sacramento is located over 500 miles from the border, Mexicali—unique among border state capitals—is located adjacent to the international boundary, presenting unique opportunities for local political consensus building and crossborder economic development.

Because of both space limitations and a desire to focus on *binational* economic development, our analysis here looks at the counties and municipios as one region. In this chapter, we look at data on three specific variables that we believe are key in analyzing potential for binational cluster-based economic development in the region: industry concentration, industry dynamism and the binational orientation of industries on both sides of the border. We complement this data-driven analysis with a qualitative analysis based on discussion and findings from our focus group hosted by the CaliBaja Mega Region in San Diego on June 22, 2015, which included key crossborder public and private-sector stakeholders with a keen interest in the region's economic development.

Concentration

As a first step in determining key industries for a binational cluster-based economic development strategy, we used a standard measure—location quotient (LQ), a measure of the concentration of industries in a given regionto pinpoint the top 20 most concentrated industries in California and Baja California counties and *municipios* as one binational subregion. As seen in the table below, audio and video equipment manufacturing has a

remarkable LQ of 29.21, meaning that the industry is over 29 times more prevalent in the region than elsewhere in the binational economy in 2013. Medical devices is a distant yet still quite impressive second with an LQ of 8.45 while semiconductors have an LQ of 6.48 in 2013. Tourism-related industries, such as land and water sightseeing, show the continued importance of this industry to the California and Baja California border subregion.

Table 1: California–Baja California Subregion 20 Most Concentrated (LQ) Industries, 2013

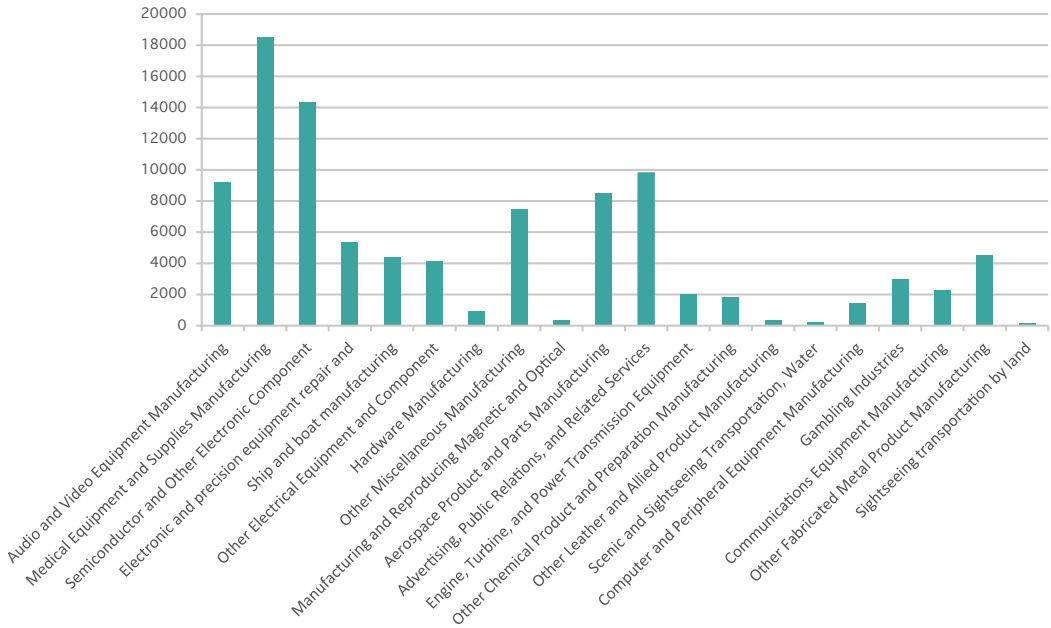
Description and NAICS Code	Employees	LQ
Audio and Video Equipment Manufacturing (3343)	22,981	29.2
Medical Equipment and Supplies Manufacturing (3391)	46,243	8.5
Semiconductor and Other Electronic Component Manufacturing (3344)	35,784	6.5
Electronic and precision equipment repair and maintenance (8112)	13,328	6.4
Ship and boat manufacturing (3366)	10,988	5.7
Other Electrical Equipment and Component Manufacturing (3359)	10,425	4.2
Hardware Manufacturing (3325)	2,320	4.2
Other Miscellaneous Manufacturing (3399)	18,664	3.8
Manufacturing and Reproducing Magnetic and Optical Media (3346)	960	3.8
Aerospace Product and Parts Manufacturing (3364)	21,282	3.7
Advertising, Public Relations, and Related Services (5418)	24,573	3.4
Engine, Turbine, and Power Transmission Equipment Manufacturing (3336)	5,045	3.2
Other Chemical Product and Preparation Manufacturing (3259)	4,578	3.1
Other Leather and Allied Product Manufacturing (3169)	922	2.9
Scenic and Sightseeing Transportation, Water (4872)	566	2.7
Computer and Peripheral Equipment Manufacturing (3341)	3,572	2.7
Gambling Industries (7132)	7,417	2.7
Communications Equipment Manufacturing (3342)	5,624	2.7
Other Fabricated Metal Product Manufacturing (3329)	11,237	2.6
Sightseeing transportation by land (4871)	477	2.5

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

The size, scope and distribution of employment of the top 20 LQ industries for the subregion is unique in the U.S.-Mexico border region. Ten of the top twenty most concentrated

industries have over 10,000 employees while five employ over 20,000 employees, a sign of the significant benefits of large urban areas in terms of cluster formation. Medical devices, while relatively less concentrated (8.45) than audio visual equipment (29.21) employed over twice as many people (46,243 v. 22,981) in 2013. Semiconductors employed 35,784 that same year. Aerospace, while less concentrated than in other subregions (3.69), still employed some 21,282 in 2013, more than any other border subregion.[1] Also unique to the California-Baja California region within the U.S.-Mexico border region overall is the presence of a large and concentrated advertising industry, employing 24,573.

Figure 1. Employment for the 20 Most Concentrated Industries (LQ), California-Baja California Subregion, 2013



Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

1 AriSon, with nearly 18,000 aerospace industry employees, comes in a close second.

Dynamism

The second step for our analysis was to determine which industries were the most dynamic in the California-Baja California border region. By employing a shift-share analysis (which looks at national, industry and local growth effects on particular industries) of the region's employment data from 2009 and 2013, we obtain an interesting and entirely different picture of the region's areas of economic opportunity. Two of the top 20 most concentrated industries appear as the most dynamic industries in the region: Other Chemical Product and Preparation Manufacturing (with a competitiveness index of 5.3 and employment growth of 531% between 2009 and 2013), and Electronic and Precision Equipment Repair and Maintenance (with a competitiveness index of 1.6 and employment growth of 157% between 2009 and 2013). Both industries are significant employers in the region, with 3,852 and 8,137 employees, respectively). These industries, therefore, are both important local employers and quite competitive. Chemical product employment is most concentrated in Mexicali, but both San Diego and Tijuana also have more than 300 jobs in the industry, making this an interesting industry for potential regional collaboration. The electronic and precision equipment repair industry, which stands out as a binational service industry, is also dispersed across the region, with more than 3,000 jobs on each side of the border.

The other 18 industries in the top 20 list include Fiber, Yarn, and Thread Mills which leads the list with a competitiveness index of 31.464 (though only had a few hundred employees in 2013) to the Electronic and Precision Equipment Repair and Maintenance which has a competitiveness index of 5.331, employs over 3800 people in the region and has employment growth of 530.58% between 2009 and 2013.

And finally, it should be noted that while many of these dynamic industries are still small (Iron and Steel Mills and Ferroalloy Manufacturing had grown to a mere 50 employees in the region by 2013, for example), their competitiveness index combined with steep employment growth curves make them industries to monitor closely in the coming years.

Table 2. California – Baja Border Subregion, Most Dynamic Industries (Shift – Share Analysis, 2009 – 2013)

Description and NAICS Code	Competitiveness Index	Change # Jobs 2009-2013	Employment Growth 2009 - 2013
Fiber, Yarn, and Thread Mills (3131)	31.5	317	3170%
Alumina and Aluminum Production and Processing (3313)	29.0	495	2912%
Footwear Manufacturing (3162)	19.1	307	1919%
Seafood Product Preparation and Packaging (3117)	9.3	158	929%
Other Chemical Product and Preparation Manufacturing (3259)	5.3	3,852	531%
Iron and Steel Mills and Ferroalloy Manufacturing (3311)	4.9	50	500%
Textile Furnishings Mills (3141)	4.1	402	394%
Other Pipeline Transportation (4869)	2.8	50	250%
Paint, Coating, and Adhesive Manufacturing (3255)	2.1	401	206%
Cable and Other Subscription Programming (5152)	2.0	43	253%
Boiler, Tank, and Shipping Container Manufacturing (3324)	2.0	282	206%
Nonferrous Metal (except Aluminum) Production and Processing (3314)	1.9	115	192%
Electronic and Precision Equipment Repair and Maintenance (8112)	1.6	8,137	157%
Other General Purpose Machinery Manufacturing (3339)	1.5	3,221	156%
Grain and Oilseed Milling (3112)	1.3	518	136%
Aquaculture (1125)	1.2	84	118%
Support Activities for Rail Transportation (4882)	1.2	31	155%
Fabric Mills (3132)	1.1	14	93%
Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing (3334)	1.0	1,121	105%
Agriculture, Construction, and Mining Machinery Manufacturing (3331)	1.0	406	107%

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Trade and Binationalism

While we now know the most concentrated and dynamic industries in the California-Baja California region, to what degree are these key industries in the California and Baja California border region related in a crossborder fashion? This is a key question to ask as the two federal governments have made binational industry cluster development a priority under the U.S.-Mexico High-Level Economic Dialogue. This is a challenging area of research because key methodological issues for answering this question have yet to be ironed out, as mentioned in the introduction. To take one example, trade data by NAICS code gathered at the county/*municipio* level would have been useful for this report but is not available in the United States or Mexico.

Yet we thought it was important to begin to answer this question, and although county/*municipio*-level trade data was unavailable for our analysis we can begin to gain an understanding of how similar concentrated and dynamic industries in both *states* engage in crossborder trade at least at the three-digit NAICS subsector level (rather than the more detailed four-digit NAICS industry group level). The export intensity of industries begins to give us some insights of state-to-state crossborder trade and clusters, although, as noted in the introduction, GDP and export figures come from different data sources and therefore can create some difficulties in calculating trade intensity. However, we do get a strong indication of which industries are involved in binational economic activity. As seen in the tables below, numerous manufacturing subsectors in California and Baja California comprise a majority of total merchandise exports to the neighboring country. These subsectors contain many of the most concentrated and dynamic industry groups (four-digit NAICS) in the binational top 20 lists above, including audio and video equipment manufacturing, semiconductors, ship and boat manufacturing, aerospace and others.

See Appendices A and B for notes on the interpretation of the values in the trade and GDP tables.

Table 3. California GDP and Exports to Mexico by Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to California GDP (Million USD)	% of Total CA GDP	Exports California to Mexico (Million USD)	% of Total State Exports to MX	Exports to MX/ GDP (%)
Oil and gas extraction (211)	22,712	1.03%	200	0.85%	0.88%
Mining, except oil and gas (212)	1,571	0.07%	144	0.61%	9.15%
Wood products manufacturing (321)	1,501	0.07%	265	1.13%	17.66%
Nonmetallic mineral products manufacturing (327)	2,991	0.14%	200	0.85%	6.67%
Furniture and related products manufacturing (337)	2,087	0.09%	95	0.40%	4.54%
Miscellaneous manufacturing (339)	14,982	0.68%	954	4.06%	6.37%
Farms (111 - 112)	26,554	1.20%	669	2.84%	2.52%
Forestry, fishing, and related activities (113 - 115)	10,792	0.49%	27	0.11%	0.25%
Food and beverage and tobacco products manufacturing (311 - 312)	23,810	1.08%	1,620	6.89%	6.80%
Textile mills and textile product mills (313 - 314)	1,115	0.05%	469	1.99%	42.06%
Apparel and leather and allied products manufacturing (315 - 316)	3,576	0.16%	591	2.52%	16.54%
Paper Manufacturing, Printing and related support activities (322 - 323)	5,873	0.27%	778	3.31%	13.24%
Petroleum and Coal Products Manufacturing, Plastics and rubber products manufacturing (324 -326)	74,808	3.38%	4,408	18.75%	5.89%
Primary metals manufacturing, fabricated metal products (331 - 332)	14,172	0.64%	2,370	10.08%	16.72%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	85,880	3.88%	10,722	45.61%	12.49%
State GDP, Subsector Exports	**2,212,991**		**23,510**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Table 4. Baja California GDP and Exports to the U.S. By Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to Baja California GDP (Million USD)	% of Total Baja California GDP	Exports Baja California to the US (Million USD)	% of Total State Exports to U.S.	Exports to U.S./ GDP (%)
Mining, except oil and gas (212)	125	0.37%	22	0.09%	17.44%
Wood products manufacturing (321)	20	0.06%	18	0.07%	89.86%
Nonmetallic mineral products manufacturing (327)	276	0.81%	261	1.03%	94.56%
Furniture and related products manufacturing (337)	264	0.77%	509	2.00%	193.17%
Miscellaneous manufacturing (339)	860	2.53%	2,925	11.52%	339.96%
Food and beverage and tobacco products manufacturing (311 - 312)	1,374	4.04%	184	0.72%	13.36%
Textile mills and textile product mills (313 - 314)	37	0.11%	22	0.09%	60.37%
Apparel and leather and allied products manufacturing (315 - 316)	78	0.23%	244	0.96%	313.68%
Paper products and printing and related support activities (322 - 323)	375	1.10%	340	1.34%	90.53%
Petroleum and Coal Products Manufacturing, Plastics and rubber products manufacturing 324 - 326)	365	1.07%	906	3.57%	248.53%
Primary metals manufacturing, fabricated metal products (331 - 332)	408	1.20%	1,495	5.89%	366.62%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	2,760	8.11%	18,470	72.73%	669.10%
State GDP, Subsector Exports	**34,030**		**25,396**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

California - Baja California Findings and Recommendations

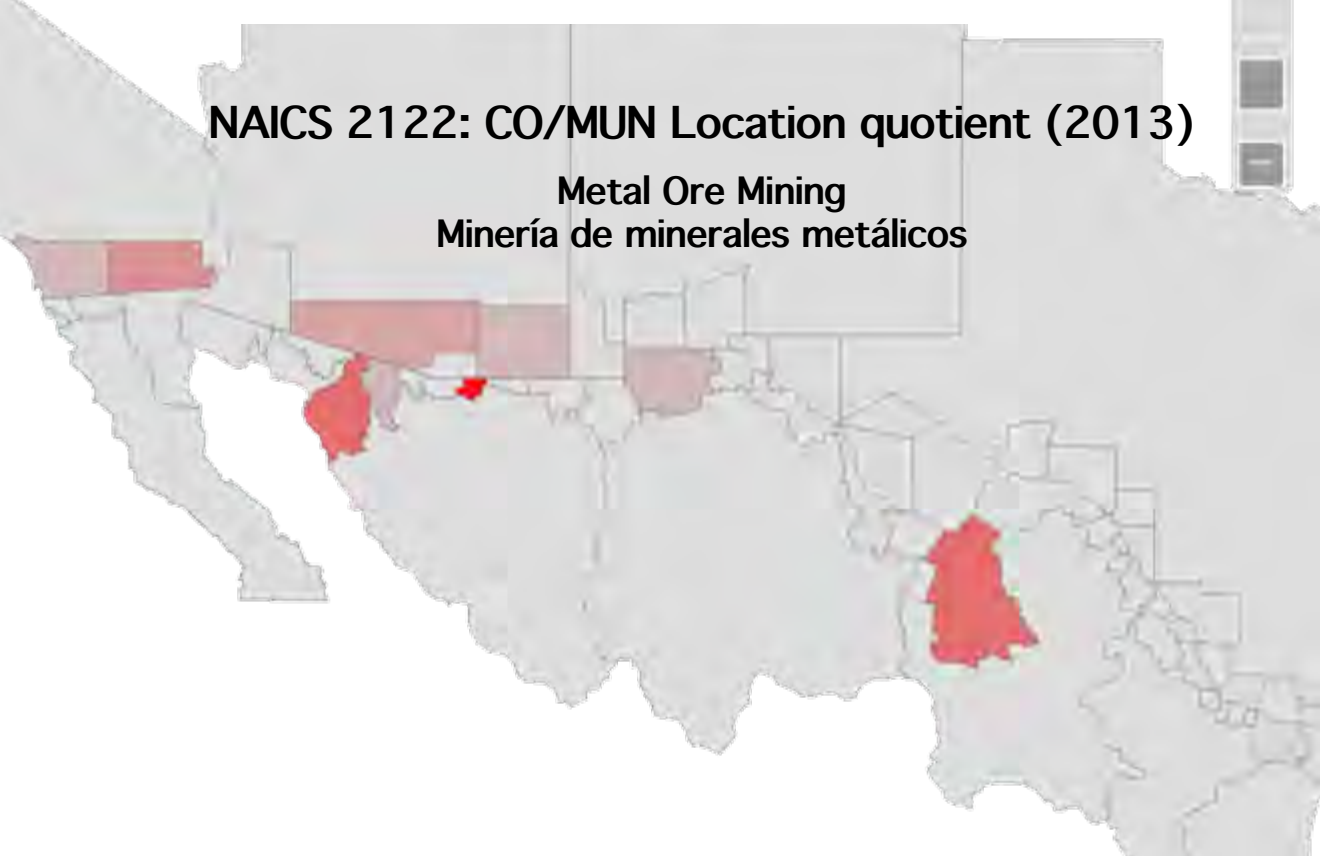
The California-Baja California Binational Industry Mapping Focus Group was held in San Diego on June 22, 2015 and attended by two dozen key crossborder economic stakeholders. Former U.S. Consul General in Tijuana Andrew Erickson and Mexican Consul General Remedios Gómez Arnau gave opening remarks that emphasized the region's numerous binational economic accomplishments and challenges for building competitiveness in the years ahead.

Even in a highly developed crossborder region such as the CaliBaja Mega Region, the negative perception of the border was identified as a major challenge for crossborder collaboration. Yet apart from the fundamental challenge posed by current U.S.-Mexico border-crossing inefficiencies, participants pointed out a number of organizational challenges. While more formally constituted on the Mexican side, clusters were less organized on the U.S. side. Developing solid incentives for broad-based participation in clusters was pointed out as one of the major challenges in developing binational clusters. Another major challenge touched upon by numerous participants was how to connect the cluster groups that have developed in Baja California with those that have developed in southern California. For example, linking the medical devices cluster on the Mexican side of the border with the life sciences cluster in San Diego continues to be a challenge in the region. Several participants pointed out the challenges presented by the "skills gap" in which even students graduating with engineering and other technical degrees did not always possess the skills that companies in the region are looking for. More broadly, several participants pointed out the ongoing disconnect between the private sector, government and universities that would ideally underpin the development of binational industry clusters in the region.

The most significant opportunity for binational cluster-based economic development is the enormous amount of institutional, organizational and individual interest in crossborder economic development in the California-Baja California border region. The highly visible roles of the U.S. and Mexican Consulate Generals in binational economic development in the region is in itself an emerging best practice.

As noted above, our analysis finds limited *binational* cluster activity taking place in the California-Baja California border region. Our analysis shows that that the CaliBaja mega region is notable for its size, robust interest in binational engagement and the complexity of the development of its binational industries. Yet, the continuing disconnects noted between government, private-sector and universities in the region are further evidence that while advanced in numerous ways, much work remains to bring the full crossborder economic potential of the California-Baja California border region to fruition via binational cluster-based economic development.

Organizations aiming to strengthen development in the binational subregion should carefully monitor and begin engaging the concentrated, dynamic and binational industries, exploring opportunities to connect industry leaders, educational institutions and government and develop *binational* cluster-based approaches to economic development in the California-Baja California mega region.



Map of the concentration (LQ) of the mining industry in the U.S.-Mexico border region, 2013.

Chapter 2

The Arizona-Sonora Border Subregion

Overview

The Arizona-Sonora border region finds itself in need of transition. At various times and at various speeds, stakeholders in both Arizona and Sonora have undertaken a variety of efforts toward defining clusters in the two states though with mixed results. Interest and resources from both the public and private sectors for this focus have been cyclical. Watershed events such as the passage of the North American Free Trade Agreement and, more recently, a broad-based, economics-driven reaction against Arizona's anti-immigrant politics have boosted interest in creating cluster-related programs, projects and various types of analysis. While the will to move forward with these programs exists throughout the border region and in the state capitals, challenges remain in terms of building robust mechanisms for sustained and coordinated crossborder dialogue, planning, implementation and evaluation of efforts to implement crossborder economic development strategies, particularly in the border region.

The Arizona counties of Yuma, Pima, Santa Cruz and Cochise together with the Sonoran *municipios* of San Luis Río Colorado, Puerto Peñasco, General Plutarco Elías Calles, Caborca, Altar, Sáric, Nogales, Santa Cruz, Naco, and Agua Prieta comprise the focus for this chapter. Tucson is the largest city in the region, and major binational urban areas include Yuma/Somerton/San Luis/San Luis Rio Colorado, Ambos Nogales, and Douglas/Agua Prieta. The region anchors for the recently formed AriSon Mega Region. State capitals Phoenix and Hermosillo are about 180 miles (290 kilometers) from the border.

In our quantitative analysis in this chapter, we look at data on three variables that are key in carrying out binational cluster-based economic development in the region: industry concentration, industry dynamism and how "binational" similar industries on both sides of the border are. We complement this data-driven analysis with a qualitative analysis based on discussion and findings from our focus group in Tucson, Arizona on June 24, 2015, which included several dozen key public and private-sector stakeholders with a keen interest in the region's economic development.

Concentration

As a first step in determining key industries for a binational cluster-based economic development strategy, we used a standard measure—location quotient (LQ), a measure of the concentration of industries in a given region —to pinpoint the top 20 most concentrated industries in Arizona and Sonoran border counties and *municipios* as one binational subregion. As seen in Table 1, metal ore mining, audio and video equipment manufacturing, and aerospace product and parts manufacturing all have a location quotient of over 10. Hardware manufacturing, furniture manufacturing, rooming, semiconductors,

electrical equipment, medical equipment and seafood product preparation round out the top 10. We also see strong evidence of traditional primary sector economic activity in the region including mining as well as evidence of important services such as tourism (RV parks, rooming houses, fishing).

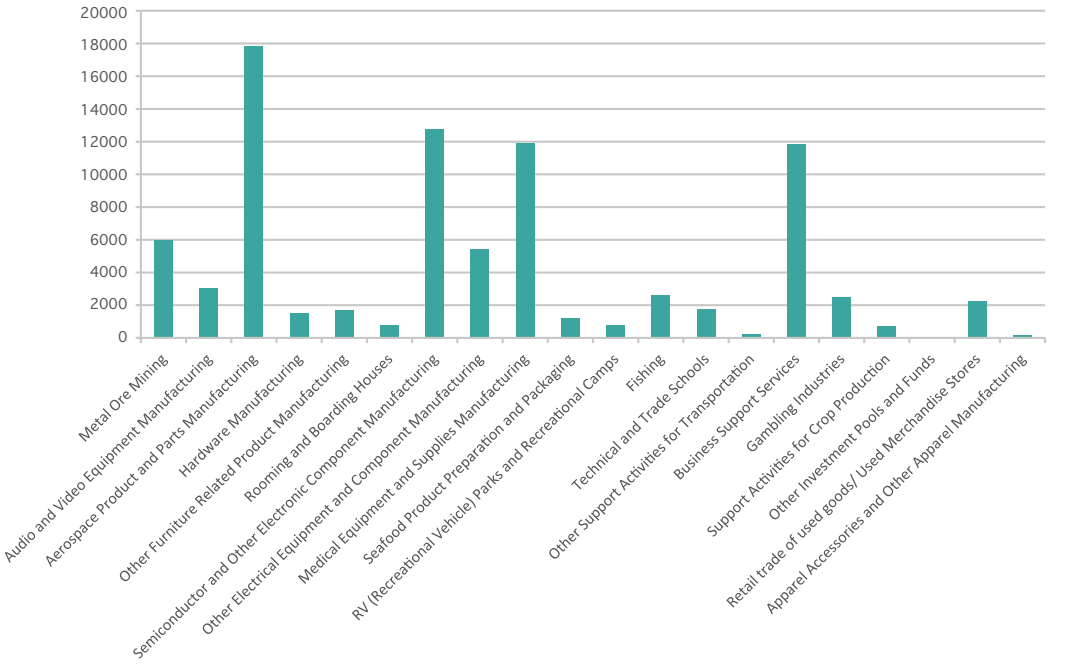
Table 1. Arizona – Sonora Subregion 20 Most Concentrated (LQ) Industries, 2013

Description and NAICS Code	Employees	LQ
Metal Ore Mining (2122)	5,933	14.1
Audio and Video Equipment Manufacturing (3343)	3,050	13.6
Aerospace Product and Parts Manufacturing (3364)	17,813	10.9
Hardware Manufacturing (3325)	1,,493	9.5
Other Furniture Related Product Manufacturing (3379)	1663	9.0
Rooming and Boarding Houses (7213)	762	8.6
Semiconductor and Other Electronic Component Manufacturing (3344)	12,724	8.1
Other Electrical Equipment and Component Manufacturing (3359)	5,403	7.7
Medical Equipment and Supplies Manufacturing (3391)	11,863	7.6
Seafood Product Preparation and Packaging (3117)	1,219	7.1
RV (Recreational Vehicle) Parks and Recreational Camps (7212)	751	4.6
Fishing (1141)	2,627	4.1
Technical and Trade Schools (6115)	1,767	3.5
Other Support Activities for Transportation (4889)	236	3.3
Business Support Services (5614)	11,823	3.2
Gambling Industries (7132)	2,469	3.1
Support Activities for Crop Production (1151)	710	2.7
Other Investment Pools and Funds (5259)	60	2.6
Retail trade of used goods/ Used Merchandise Stores (4664 + 4533)	2,216	2.5
Apparel Accessories and Other Apparel Manufacturing (3159)	126	2.4

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

In terms of employment, aerospace by far is the most significant employer of the top LQ industries in the Arizona-Sonora border subregion, with almost 18,000 employees distributed on both sides of the border. The development of the aerospace industry in neighboring states is an interesting story of highly concentrated, closely located yet largely unrelated industries. While Arizona's aerospace industry is mostly defense-related, the industry in Sonora is commercial in nature. Semiconductors, medical equipment and business support services are also significant employers and all have over 10,000 employees. See Graph 1 on following page.

Figure 1. Employment for the 20 Most Concentrated Industries (LQ), Arizona - Sonora Subregion, 2013



Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Dynamism

The second step for our analysis was to determine which industries were the most dynamic in the Arizona-Sonora border subregion. By employing a shift-share analysis (which looks at national, industry and local growth effects on particular industries) of the region's employment data from 2009 and 2013, we get an interesting and different picture of the region's potential areas of economic opportunity. Aerospace and semiconductors—to take two key examples—do not appear in the top 20 in terms of their dynamism. Instead, we see industries such as apparel manufacturing, investment pools, and boiler manufacturing, tanks and shipping containers assuming significance not only as concentrated industries but also as particularly dynamic industries as well.. In addition, the medical devices industry added more than 5,000 jobs between 2009 and 2013, as well as being a highly concentrated industry, making it an excellent candidate for cluster based economic development. Seafood product packaging also stands out for dynamism in addition to concentration. The performance of technical and trade schools points to the importance of workforce development efforts in the region. The relatively competitive position of fruit and vegetable preserving in the region is also worth noting as competition between U.S.-Mexico trade corridors to deliver produce to market is increasing.

While many of these industries are still small, their competitiveness index, signalling steep employment growth curves, make them industries that mega regions and other economic development stakeholders in the Arizona-Sonora border subregion will want to watch closely in the coming months and years. Indeed, one of the key recommendations for this report is for local mega regions to monitor and begin dialogue with these emerging industries over the coming years (see recommendations in introduction).

Table 2. Arizona - Sonora Subregion, Most Dynamic Industries (Shift – Share Analysis, 2009 – 2013)

Description and NAICS Code	Competitiveness Index	Change # Jobs 2009-2013	Employment Growth 2009 - 2013
Apparel Accessories and Other Apparel Manufacturing (3159)	6.7	109	641%
Seafood Product Preparation and Packaging (3117)	5.6	1,035	563%
Other Investment Pools and Funds (5259)	5.2	50	500%
Boiler, Tank, and Shipping Container Manufacturing (3324)	4.9	50	500%
Other Pipeline Transportation (4869)	2.8	50	250%
Nonferrous Metal (except Aluminum) Production and Processing (3314)	2.4	255	248%
Other chemical products manufacturing (3259)	2.4	223	240%
Electric Lighting Equipment Manufacturing (3351)	2.8	161	227%
Textile and Fabric Finishing and Fabric Coating Mills (3133)	2.6	23	230%
Interurban and Rural Bus Transportation (4852)	2.3	182	240%
Other Support Activities for Transportation (4889)	2.2	154	188%
Rooming and Boarding Houses (7213)	1.9	527	224%
Technical and Trade Schools (6115)	1.8	1,136	180%
Soap, Cleaning Compound, and Toilet Preparation Manufacturing (3256)	1.3	22	129%
Audio and Video Equipment Manufacturing (3343)	1.2	1,598	110%
Animal Food Manufacturing (3111)	1.1	10	100%
Foundries (3315)	0.9	29	94%
Fruit and Vegetable Preserving and Specialty Food Manufacturing (3114)	0.9	176	88%
Medical Equipment and Supplies Manufacturing (3391)	0.8	5,401	84%
Spring and Wire Product Manufacturing (3326)	0.8	47	78%

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Trade and Binationalism

To what degree are key industries in the Arizona and Sonora border subregion related in a crossborder fashion? Although trade figures are calculated at the state level—rather than the county/*municipio* level—in both the United States and Mexico, we can begin to gain an understanding of how industries in both Arizona and Sonora engage in crossborder trade and use this data in conjunction with data presented in the previous two sections (concentration and dynamism) to gain a deeper understanding of the binational orientation or regional industries.

Findings of note include the mining industry in Arizona, which exhibits a high location quotient and makes up nearly a quarter of the state's exports to Mexico. Various subsectors grouped together (Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336) make up a combined more than 35% of Arizona's exports to Mexico. This grouping of subsectors is even more significant for Sonora, making up approximately 70% of the state's exports to the United States. Of note is the relatively small percentage of total exports to the United States made up by the Sonoran mining industry (4.62%).

Without a doubt, this is an area for further research. These data are not without their pitfalls, however. Very large exports/GDP percentages may be generated for a number of reasons, which are discussed in Appendix B. Trade data gathering at the county/*municipio* level would be enormously useful for a binational cluster-based economic development effort as it would give a more precise indication of local economic activity and trends.

See Appendices A and B for notes on the interpretation of the values in the trade and GDP tables.

Table 3. Arizona GDP and Exports to Mexico by Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to Arizona GDP (Million USD)	% of Total AZ GDP	Exports Arizona to Mexico (Million USD)	% of Total State Exports to MX	Exports to MX/ GDP (%)
Oil and gas extraction (211)	6	0.00%	545	7.80%	9089.85%
Mining, except oil and gas (212)	6,054	2.20%	1676	23.97%	27.68%
Wood products manufacturing (321)	176	0.06%	31	0.44%	17.50%
Nonmetallic mineral products manufacturing (327)	575	0.21%	23	0.33%	3.99%
Furniture and related products manufacturing (337)	320	0.12%	16	0.22%	4.89%
Miscellaneous manufacturing (339)	1,454	0.53%	144	2.05%	9.88%
Farms (111-112)	1,687	0.61%	199	2.84%	11.77%
Forestry, fishing, and related activities (113 - 115)	587	0.21%	2	0.03%	0.34%
Food and beverage and tobacco products manufacturing (311 - 312)	1,730	0.63%	210	3.00%	12.14%
Textile mills and textile product mills (313 - 314)	91	0.03%	154	2.20%	169.03%
Apparel and leather and allied products manufacturing	23	0.01%	21	0.30%	91.19%
Paper Manufacturing, Printing and related support activities	660	0.24%	182	2.60%	27.50%
Petroleum and Coal Products Manufacturing, Plastics and rubber products manufacturing	1,650	0.60%	698	9.98%	42.32%
Primary metals manufacturing, fabricated metal products (331 - 332)	2,262	0.82%	494	7.07%	21.84%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	9,712	3.54%	2,599	37.17%	26.76%
State GDP, Subsector Exports	**274,734**		**6,992**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Table 4: Sonora GDP and Exports to the U.S. By Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to Sonora GDP (Million USD)	% of Total Sonora GDP	Exports Sonora to the US (Million USD)	% of Total State Exports to U.S.	Exports to U.S./ GDP (%)
Mining, except oil and gas (212)	5,058	13.90%	649	4.62%	16.28%
Wood products manufacturing (321)	15	0.04%	1	0.01%	9.95%
Nonmetallic mineral products manufacturing (327)	246	0.68%	11	0.08%	5.53%
Furniture and related products manufacturing (337)	47	0.13%	103	0.73%	279.46%
Miscellaneous manufacturing (339)	179	0.49%	918	6.54%	650.95%
Food and beverage and tobacco products manufacturing (311 - 312)	1,824	5.01%	364	2.59%	19.98%
Textile mills and textile product mills (313 - 314)	81	0.22%	38	0.27%	59.28%
Apparel and leather and allied products manufacturing (315 - 316)	82	0.23%	162	1.15%	249.83%
Paper products and printing and related support activities (322 - 323)	63	0.17%	47	0.33%	93.43%
Petroleum, plastic and chemical product manufacturing (324 - 326)	314	0.86%	515	3.67%	208.46%
Primary metals manufacturing, fabricated metal products (331 - 332)	1,314	3.61%	1,304	9.29%	126.00%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	3,526	9.69%	9,934	70.73%	357.53%
State GDP, Subsector Exports	**36,389**		**14,045**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Arizona-Sonora Findings and Recommendations

The Arizona-Sonora Binational Industry Mapping Focus Group was held at the Consulate of Mexico in Tucson on June 24, 2015 and attended by several dozen key crossborder economic stakeholders. The discussion centered around key topics including the following:

- The need for rebranding Arizona as a state willing to engage in binational economic cooperation.
- A shift from the state of Arizona's current focus on border security to a focus on growing the Arizona-Mexico commercial relationship.
- Continuing to focus on improvements to binational trade infrastructure.
- The need to strengthen industry-government cooperation more generally.
- Analyzing and capturing current efforts and emerging best practices that can contribute to successful cluster-based economic development.

The state of Arizona's challenges with its recent past focus on border security, the military checkpoint at Querobabi, Sonora and issues over crossborder banking were all noted as key disadvantages facing the region. In addition, there is an ongoing need for deeper crossborder collaboration; one participant noted that the two states were not really working together and that decisions were usually made on the U.S. side before conducting effective outreach to Mexican stakeholders. Yet another participant noted that a more strategic focus is needed, particularly with respect to human capital.

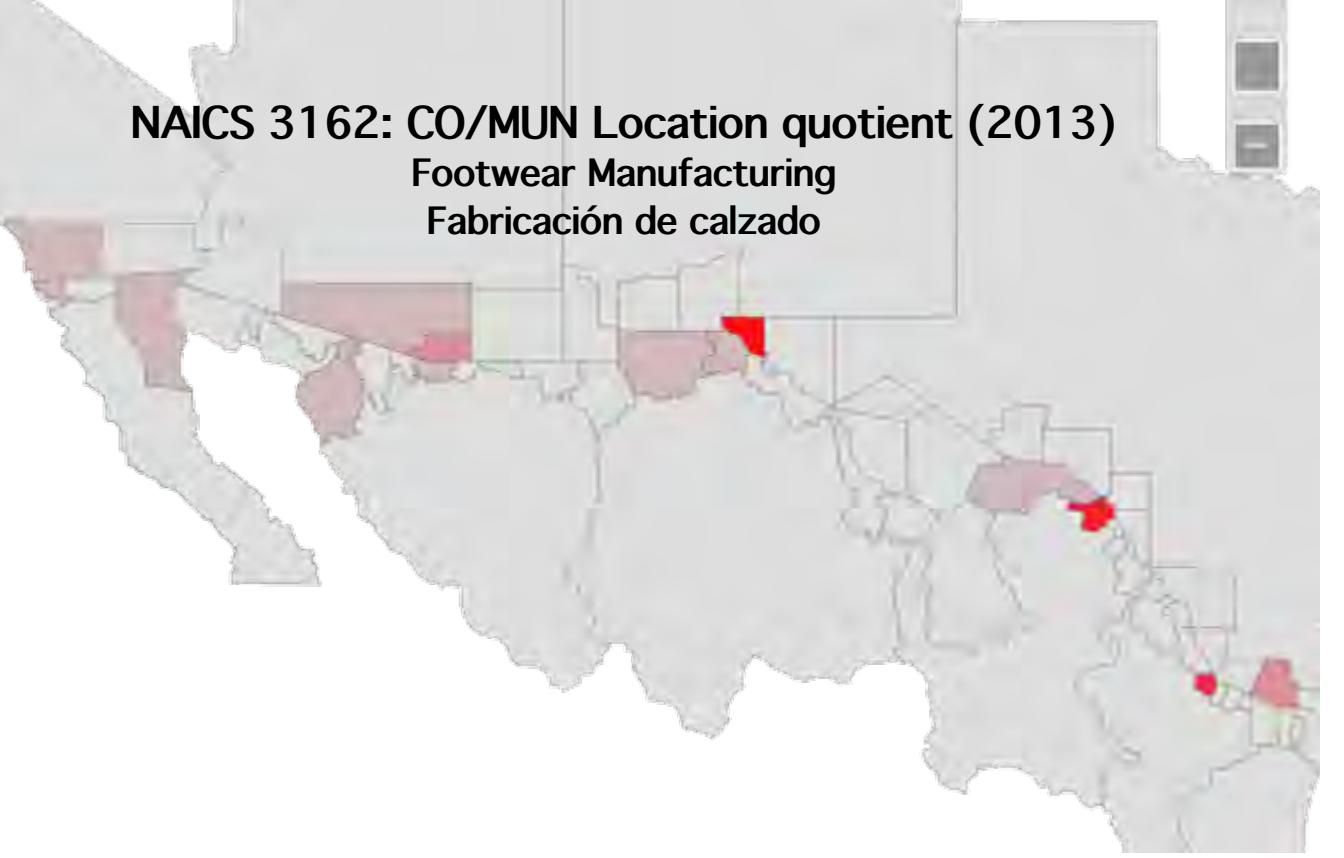
Participants emphasized the need for the Arizona-Sonora border region to improve its joint marketing and to learn from other regions such as the CaliBaja Mega Region. The Metromatemáticas program in Guaymas, Sonora was pointed to as a successful program that teaches high school students the math needed in high tech industries and which has good potential to close the skills gap. In terms of strategy, one public-sector participant stressed the need to build Arizona's foreign direct investment from Mexico with an emphasis on attracting early-stage companies. Another participant said that because the vast majority of jobs in Arizona were generated by small businesses, the focus should be on connecting this sector to its counterparts in Sonoran communities. Additional participants noted that crossborder tourism—a major economic driver in southern Arizona— presents a significant opportunity that has not yet been fully understood.

When we pull together the quantitative and qualitative aspects of our analysis, we find a region in active transition with tremendous energy for binational economic development, though no binational cluster organization has taken place. The AriSon Mega Region joins

several newer binational organizations in the region such as the Sun Corridor and the Tucson-Mexico Trade Coalition, notable for a region with such well-established binational organizations as the Arizona-Mexico Commission and Comisión Sonora-Arizona (both based in the state capitals several hundred miles from the border).

As is the case with other border subregions, a greater degree of cross-sector organization is needed to better articulate and grow clusters. Aerospace, medical devices and mining stand out as some of the better-known and understood opportunities, though additional opportunities are emerging in industries such as apparel manufacturing, investment pools, and boiler, tank and shipping container manufacturing. These industries need to be closely monitored in the coming years for their potential to develop into key clusters.

At a broader level, binational economic development in the subregion will only be successful if Arizona and Sonora binational economic development organizations and border communities conduct sustained dialogue, planning, implementation and evaluation. This requires that the current trend toward deeper bilateral engagement continue and be regularized, adding sustainability to the dialogue. These efforts could include a variety of specific measures such as regular crossborder meetings between city, state and federal officials, members of the private sector and analysts. Sustained dialogue with U.S. and Mexican consulates, the Arizona-Mexico Commission / Comisión Sonora-Arizona and the AriSon Mega Region can provide additional input and help to position local efforts within a broader context.



Map of the concentration (LQ) of the footwear production industry in the U.S.-Mexico border region, 2013.

Chapter 3

The Paso del Norte Subregion: Chihuahua-New Mexico-Texas

Overview

The Paso del Norte region was the birthplace of binational manufacturing in the 1960s and sits at the crossroads of centuries-old trade routes. Its history has not faded even as the economy has modernized. Manufacturing and logistics still drive the local economy, although traditional industries such as boot-making and apparel have been supplemented by a huge auto-parts industry and large computer and electronics production, among others. The region stretches out to include several rural counties/*municipios* in three states, yet it is anchored by the large Ciudad Juárez-El Paso-Sunland Park binational urban area, which is home to over two million residents.

As defined in our study, this subregion includes the Texas counties of Brewster, El Paso and Presidio; the New Mexico counties of Doña Ana, Hidalgo, and Luna; and the Chihuahua *municipios* of Ascensión, Guadalupe, Janos, Juárez, Manuel Benavides, Ojinaga, and Praxedis G. Guerrero. The Mexican side of the border is heavily industrialized, with some 64% of total Ciudad Juárez employment coming from the manufacturing sector. On the U.S. side, services across a wide range of industries dominate, generating over two-thirds of local employment.[1]

The region has significant transportation assets, sitting at the nexus of major north-south and east-west interstate highway networks (U.S. 10 and 25, Mexico's 45) and rail corridors (including Ferromex, Union Pacific, and Burlington Northern Santa Fe lines). This has allowed the logistics industry to flourish, but has also driven the development of the region as a major manufacturing platform. The location attracted manufacturers, and the production plants in turn attracted workers.

The quick growth of manufacturing and, as a consequence, population in Ciudad Juárez over the last several decades came with its share of challenges in terms of building physical and social infrastructure, but it has left the subregion quite well-positioned to pursue strategies for binational economic development. The region's biggest economic asset is its large skilled workforce—its people. Over time, the region has moved up the value-add ladder, transitioning from a focus on apparel and low-cost assembly to industries that require higher levels of skilled labor, such as automotive and medical device production. The challenge now is to continue the climb, and a relentless focus on improving education and worker training, as well as a major effort to better connect and coordinate economic development efforts on both sides of the border, is the way to achieve it.

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1 Hunt Institute for Global Competitiveness, "Paso Del Norte Economic Indicator Review," El Paso: University of Texas at El Paso, Spring 2015, http://huntinstitute.utep.edu/wp-content/uploads/2014/04/Paso-del-Norte-Economic-Indicator-Review-No-1-April-2015.pdf.

Concentration

Location Quotients (LQ) are a measure of the concentration of industries in a region. In Table 1, we see that Leather and Hide Tanning and Finishing is the most concentrated industry in the Paso del Norte tri-state region. The value of 32.7 means that the concentration of leather industry jobs is nearly 33 times as great as the average for the whole U.S.-Mexico binational economy. Since concentration is associated with competitiveness, our results suggest that Paso del Norte has developed significant competitiveness in the production of leather goods, computers, communications equipment, motor vehicle parts, medical devices, and household appliances, among other industries. Most of these industries are driven by the strong presence of those industries in Ciudad Juárez, but a series of industries related to leather goods and footwear production (i.e. cowboy boots) come through as quite significant in both Juárez and El Paso, which describes itself as the "boot capital of the world."

Table 1: Paso del Norte Subregion 20 Most Concentrated (LQ) Industries, 2013

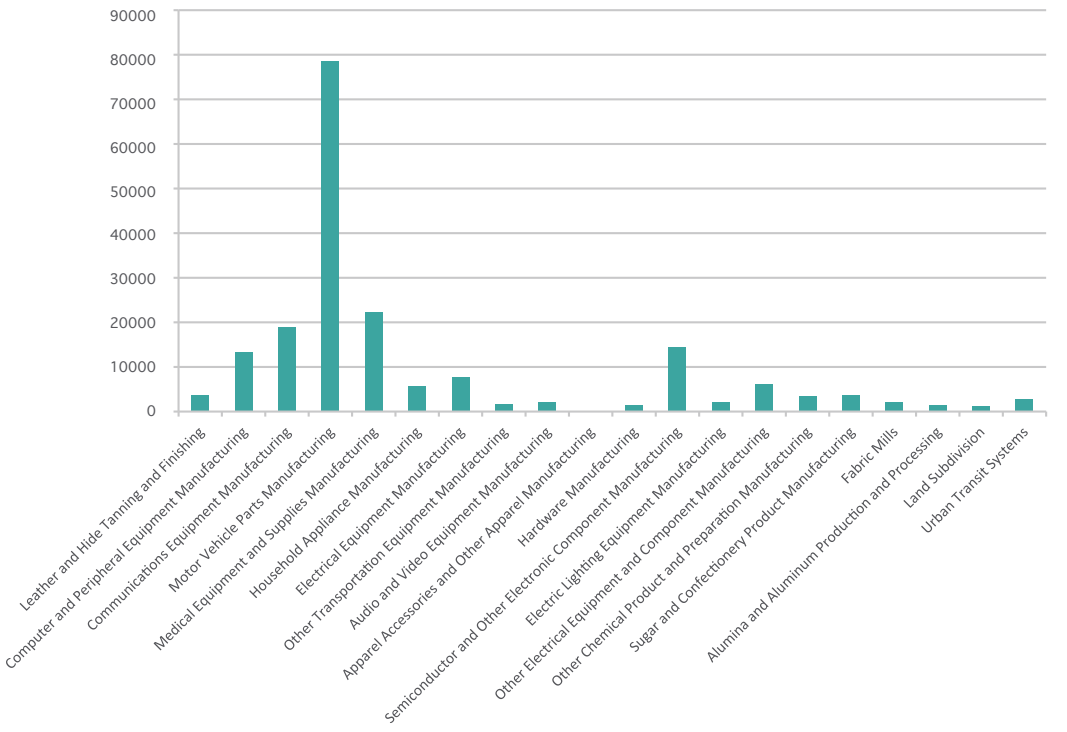
Description and NAICS Code	Employees	LQ
Leather and Hide Tanning and Finishing (3161)	3,656	32.7
Computer and Peripheral Equipment Manufacturing (3341)	13,429	28.7
Communications Equipment Manufacturing (3342)	18,916	25.5
Motor Vehicle Parts Manufacturing (3363)	78,654	14.9
Medical Equipment and Supplies Manufacturing (3391)	22,238	11.5
Household Appliance Manufacturing (3352)	5,636	10.9
Electrical Equipment Manufacturing (3353)	7,771	9.4
Other Transportation Equipment Manufacturing (3369)	1,643	8.2
Audio and Video Equipment Manufacturing (3343)	2,158	7.8
Apparel Accessories and Other Apparel Manufacturing (3159)	495	7.7
Hardware Manufacturing (3325)	1,479	7.6
Semiconductor and Other Electronic Component Manufacturing (3344)	14,496	7.5
Electric Lighting Equipment Manufacturing (3351)	2,135	7.3
Other Electrical Equipment and Component Manufacturing (3359)	6,151	7.1
Other Chemical Product and Preparation Manufacturing (3259)	3,383	6.5
Sugar and Confectionery Product Manufacturing (3113)	3,670	5.0
Fabric Mills (3132)	2,039	4.4
Alumina and Aluminum Production and Processing (3313)	1,406	4.3
Land Subdivision (2372)	1,177	3.6
Urban Transit Systems (4851)	2830	3.39

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Despite its somewhat lower LQ, it is motor vehicle parts manufacturing that employs the largest number of workers among the concentrated industries, with more than 78,000 jobs in the industry. Delphi and Lear, two major auto parts makers in Ciudad Juárez, alone employ 17,000 and 8,000 people respectively, making them the two single largest employers among regional manufacturers.[2] Delphi, which has multiple local production plants and a technical center employing highly skilled engineers that are responsible for innovations resulting in over 300 patents, exemplifies the way that manufacturing capacity can be leveraged to attract better paid, testing and design jobs. Interestingly, as shown in Table 2, it is the aerospace industry, rather than auto parts, that shows up as particularly dynamic (more jobs added locally compared to the broader economy). In Mexico, strong roots in automotive manufacturing are routinely being transitioned into aerospace, as aerospace firms find that employees with years of experience in the auto industry have the skills they need. Both of these industries provide good quality jobs and are worthy of careful consideration as candidates for cluster-based economic development efforts.

2 BorderPlex Alliance, "Top Maquiladoras in Cd. Juárez," 2010, http://www.borderplexalliance.org/regional-data/ciudad-juarez/market-overview/major-employers-juarez.

Figure 1. Employment for the 20 Most Concentrated Industries (LQ), Paso del Norte Subregion, 2013



Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Dynamism

As mentioned with respect to the quickly growing aerospace industry, we also measured the competitiveness of local industries by looking at the number of jobs they added between 2009 and 2013 relative to the number of jobs added in the same industry in the broader economy. A high score in the competitiveness index in Table 2 signals job growth locally that is more rapid than the national average for the industry.

Chemical production stands out as the most dynamic industry in the region, adding 3,283 jobs between 2009 and 2013. This industry relies on hydrocarbon and mineral inputs, and in that way has at least potential links to other high growth industries, including oil and gas extraction, natural gas pipeline transportation, and the important mining industries of the region. While the new jobs in chemical production came from Ciudad Juárez, New Mexico

has led the way locally in terms of natural gas production (with most growth coming from counties not immediately on the U.S.-Mexico border and therefore not included in this study). In conjunction with New Mexican production, energy reform in Mexico and pipeline construction to the east of El Paso and Juárez make the energy industry a promising one for the coming years in the Paso del Norte region. Mexico is in the process of transitioning from a heavy reliance on fuel oil for electricity generation to natural gas, which is increasing demand. While domestic production of gas is expected to grow in northeast Mexico, the boom in production already underway in southern Texas and New Mexico mean that transporting it to Mexico via pipeline is and will in many places continue to be the most efficient means of meeting that demand. Increased production and transport infrastructure also means increased availability of natural gas and associated chemicals for petrochemical industries and therefore also of petrochemicals for industries that use them as inputs. All of this is added to the petroleum refining activities and trade already underway by Western Refining. In order to fully capitalize on energy-related opportunities and to ensure that growth occurs in a sustainable way that benefits the community, the Paso del Norte energy industries and governments need to quickly organize to assess and address infrastructure and educational needs, among other planning activities.

The leather work industry, too, saw large employment gains during the last several years, demonstrating a unique level of regional specialization, and the aerospace industry, as mentioned above, has experienced significant growth. The strong local logistics industry comes through in this analysis in terms of the job growth in support activities for rail transportation.

Table 2. Paso del Norte Subregion, Most Dynamic Industries (Shift – Share Analysis, 2009 – 2013)

Description and NAICS Code	Competitiveness Index	Change # Jobs 2009-2013	Employment Growth 2009 -2013
Other Chemical Product and Preparation Manufacturing (3259)	32.9	3,283	3283%
Leather and Hide Tanning and Finishing (3161)	10.7	3,353	11067%
Aerospace Product and Parts Manufacturing (3364)	9.7	1,095	978%
Fiber, Yarn, and Thread Mills (3131)	9.5	302	974%
Commercial and Service Industry Machinery Manufacturing (3333)	8.3	92	836%
Gambling Industries (7132)	6.4	1,131	646%
Support Activities for Rail Transportation (4882)	4.7	50	500%
Farm Product Raw Material Merchant Wholesalers/ Wholesale trade of agricultural, forestry and fishing machinery and equipment (4351 + 4245)	3.7	124	376%
Junior Colleges (6112)	3.6	144	351%
Fabric Mills (3132)	2.4	1,422	230%
Oil and Gas Extraction (2111)	2.0	24	218%
Other Transportation Equipment Manufacturing (3369)	1.7	1,003	157%
Pipeline Transportation of Natural Gas (4862)	1.3	115	164%
Waste Collection (5621 + 562)	1.3	910	133%
Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing (3334)	1.1	615	107%
Support Activities for Forestry (1153)	1.0	10	100%
Psychiatric and Substance Abuse Hospitals (6222)	1.0	572	104%
Other Nonmetallic Mineral Product Manufacturing (3279)	0.8	363	79%
Land Subdivision (2372)	0.8	368	45%
Office Furniture (including Fixtures) Manufacturing (3372)	0.7	65	68%

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Trade and Binationalsim

We were able to analyze the extent to which industries are oriented to and depend on cross-border trade at the state level. For the Paso del Norte region, that required an analysis of Texas and New Mexico exports to Mexico and Chihuahua's exports to the United States. We compared the value of cross-border exports to the value of production, or GDP, for each subsector (3-digit NAICS codes) for which we were able to access export data. The resulting figure tells us the export intensity of the subsectors specifically in terms of U.S.-Mexico trade, which is a way to measure how binational industries are for those that produce tradable goods. Given that these figures are calculated using multiple data sources with various methodologies, some care is required in interpreting the figures (see Appendix B for a more detailed explanation).

These data show that the most U.S.-Mexico export intensive industries on the U.S. side of the border are generally those that are capital-, rather than labor-, intensive. Textiles and paper manufacturing fit that description and are among the subsectors with the highest export to GDP ratio in Texas, while primary metals manufacturing stands out in both Texas and New Mexico. Nonetheless, Texas production of apparel and leather products — as well as the broader category of manufactured goods and miscellaneous manufacturing, which represent approximately half of Texan exports to Mexico— are also very binationally export intensive industries.

In Chihuahua, with the exception of wood products manufacturing, we see high levels of reliance on the U.S. market across all categories of production. That is to say, it is hard to find an industry in Chihuahua that creates exportable goods yet does not export them (to the United States, based on what we know about overall Mexican trade) in significant volumes. Complex manufactured goods subsectors, in particular, are highly export intensive.

See Appendices A and B for notes on the interpretation of the values in the trade and GDP tables.

Table 3. New Mexico GDP and Exports to Mexico by Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to New Mexico GDP (Million USD)	% of Total NM GDP	Exports New Mexico to Mexico (Million USD)	% of Total State Exports to MX	Exports to MX/ GDP (%)
Oil and gas extraction (211)	5,336	5.87%	3	0.42%	0.06%
Mining, except oil and gas (212)	1,317	1.45%	51	7.07%	3.87%
Wood products manufacturing (321)	31	0.03%	2	0.29%	6.65%
Nonmetallic mineral products manufacturing (327)	157	0.17%	1	0.16%	0.75%
Furniture and related products manufacturing (337)	32	0.04%	0.2	0.04%	0.88%
Miscellaneous manufacturing (339)	105	0.12%	6	0.88%	6.07%
Farms (111-112)	1,912	2.11%	14	1.90%	0.71%
Forestry, fishing, and related activities (113 - 115)	141	0.16%	0.02	0.00%	0.01%
Food and beverage and tobacco products manufacturing (311 - 312)	484	0.53%	28	3.94%	5.86%
Textile mills and textile product mills (313 - 314)	21	0.02%	1	0.13%	4.39%
Apparel and leather and allied products manufacturing (315 - 316)	7	0.01%	0.07	0.01%	1.03%
Paper Manufacturing, Printing and related support activities (322 - 323)	105	0.12%	24	3.34%	22.94%
Petroleum, plastic and chemical product manufacturing (324 - 326)	1,398	1.54%	207	28.70%	14.79%
Primary metals manufacturing, fabricated metal products (331 - 332)	278	0.31%	113	15.70%	40.69%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	2,946	3.24%	270	37.42%	9.15%
State GDP, Subsector Exports	**90,828**		**720**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Table 4. Texas GDP and Exports to Mexico by Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to Texas GDP (Million USD)	% of Total TX GDP	Exports Texas to Mexico (Million USD)	% of Total State Exports to MX	Exports to MX/ GDP (%)
Oil and gas extraction (211)	176,895	11.36%	2,429	2.43%	1.37%
Mining, except oil and gas (212)	3,280	0.21%	149	0.15%	4.55%
Wood products manufacturing (321)	1,425	0.09%	153	0.15%	10.73%
Nonmetallic mineral products manufacturing (327)	4,062	0.26%	401	0.40%	9.87%
Furniture and related products manufacturing (337)	1,254	0.08%	289	0.29%	23.05%
Miscellaneous manufacturing (339)	3,111	0.20%	1,666	1.67%	53.54%
Farms	9,775	0.63%	1,251	1.25%	12.79%
Forestry, fishing, and related activities	1,757	0.11%	30	0.03%	1.70%
Food and beverage and tobacco products manufacturing (311 - 312)	11,438	0.73%	3,214	3.21%	28.10%
Textile mills and textile product mills (313 - 314)	450	0.03%	1,651	1.65%	366.89%
Apparel and leather and allied products manufacturing (315 - 316)	470	0.03%	476	0.48%	101.19%
Paper Manufacturing, Printing and related support activities (322 - 323)	3,840	0.25%	1,726	1.73%	44.96%
Petroleum and Coal Products Manufacturing, Plastics and rubber products manufacturing (324-326)	117,195	7.53%	28,282	28.27%	24.13%
Primary metals manufacturing, fabricated metal products (331 - 332)	19,043	1.22%	7,739	7.74%	40.64%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	56,140	3.61%	50,575	50.56%	90.09%
State GDP, Subsector Exports	**1,557,193**		**100,030**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Table 5. Chihuahua GDP and Exports to the U.S. By Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to Chihuahua GDP (Million Current USD)	% of Total Chihuahua GDP	Exports Chihuahua to the US (Million USD)	% of Total State Exports to U.S.	Exports to U.S./ GDP (%)
Oil and gas extraction (211)	0	0.00%	0	0.00%	N/A
Mining, except oil and gas (212)	1,363	4.00%	903	2.62%	66.30%
Wood products manufacturing (321)	656	1.93%	21	0.06%	3.24%
Nonmetallic mineral products manufacturing (327)	339	1.00%	76	0.22%	22.29%
Furniture and related products manufacturing (337)	84	0.25%	103	0.30%	122.70%
Miscellaneous manufacturing (339)	481	1.41%	2,158	6.26%	449.01%
Food and beverage and tobacco products manufacturing (311 - 312)	1099	3.23%	459	1.33%	41.75%
Textile mills and textile product mills (313 - 314)	52	0.15%	116	0.34%	225.03%
Apparel and leather and allied products manufacturing (315 - 316)	98	0.29%	363	1.05%	371.60%
Paper Manufacturing, Printing and related support activities (322 - 323)	163	0.48%	103	0.30%	62.90%
Petroleum, plastic and chemical product manufacturing (324 - 326)	191	0.56%	357	1.04%	186.57%
Primary metals manufacturing, fabricated metal products (331 - 332)	235	0.69%	710	2.06%	301.87%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	3677	10.80%	29,120	84.43%	791.96%
State GDP, Subsector Exports	**34,044**		**34,490**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Paso del Norte Findings and Recommendations

This section seeks to integrate the findings of our quantitative analysis with the qualitative findings of our focus groups session hosted by the Borderplex Alliance and attended by a wide range of government, academic, and business experts from the subregion, including U.S. Congressman Beto O'Rourke.

The Paso del Norte region has many important assets: skilled workers, transportation infrastructure and logistics services, a strong presence in several manufacturing industries, and key educational institutions. Nonetheless, a lack of articulation and communication across state and international boundaries leaves these assets under-utilized in the process of regional economic development. Key players in municipal planning, economic research, business organizations, and economic development throughout the region are too often unfamiliar with one another and the work of each others' organizations. Some, like the Borderplex Alliance, have made important progress in bringing together some of these key players, but there is much more work to do.

At the level of clusters, the limited nature of cross-border industrial ties within the region pose a challenge in terms of building cluster-based organizations across the border. However, opportunities do exist. Leather goods and boot-making is certainly one—the industry has already proven itself able to develop a skilled local workforce and to produce products with appeal in very different segments of the boot market, from the very high-end to economical products with a large portion of sales in the local market. It would be useful to explore the interest of local industry leaders in beginning a conversation with the various levels of government and educational and workforce development leaders to identify cooperative projects that could be undertaken to strengthen the industry.

Automotive production is another. Other parts of Texas have seen significant growth in the sector in recent years. While the U.S. side of the Paso del Norte subregion has not yet attracted major investments, the very strong concentration of auto parts manufacturers on the Mexican side makes it worthy of further attention, despite the challenges faced in past efforts to organize auto companies into a cluster-oriented group. In 2014, the mayors of El Paso, Ciudad Juárez, and Las Cruces took a joint trip to Detroit in an attempt to court additional automotive investments in the region. This type of cooperative approach to the development of this and other sectors holds much promise.

While overall manufacturing employment and production on the U.S. side of the border is relatively weak, a few industries have been able to leverage the strong manufacturing sector across the border. Plastics production, in particular, has been able to serve Mexican

producers of auto parts, computers, and medical devices.[3] Between 2009 and 2013, the plastics product manufacturing industry added 652 jobs in El Paso county, bucking the trend of overall declining employment in manufacturing and making it the manufacturing industry with the most job creation in El Paso. Electrical equipment manufacturing has also performed well in El Paso County, in part tied to the use of its product as inputs in Mexican manufacturing.[4] The electric lighting equipment industry was also one of the top job creators in El Paso from 2009 to 2013, adding 375 jobs.

Going forward, the key will not only be to strengthen cross-border industrial ties, but, given the dominance of the service industries on the U.S. side of the border, to also find ways in which U.S.-based service providers can provide for Mexican manufacturers in ways that strengthen the competitiveness of the region. Through our quantitative analysis and focus groups, we found little evidence that southern New Mexico or El Paso area companies were exporting significant services to Mexican industry. Instead, retail commerce, education, and personal banking services appeared more important in terms of the binational nature of their business.

As mentioned above, aerospace in Ciudad Juárez may be another burgeoning industry that could benefit from regional focus. New Mexico is already home to much research, design and testing in air defense, and El Paso too has similar assets at Fort Bliss, but these assets have yet to be connected to the growing production capacity on the Mexican side of the border. In the city of Chihuahua (just a few hours south of Ciudad Juárez), which has a very strong aerospace cluster, the industry has come together to develop curriculum employed at a shared training center that helps teach new workers the basics of aerospace manufacturing before they finish training at the production plant where they will later work. The Paso del Norte region might look to Chihuahua and Querétaro, which also has a successful aerospace sector, to identify ways in which industry, government (including the U.S. military), and educational institutions can partner to promote growth in the sector.

Like some other subregions of the border, the Paso del Norte region has assets in medical device manufacturing and medical tourism on the Mexican side and biosciences and medical care on the U.S. side. It is not immediately clear whether these assets can be jointly leveraged, but it would certainly be worth further study and bringing together leaders from each of these sectors to explore opportunities for collaboration and future industry development.

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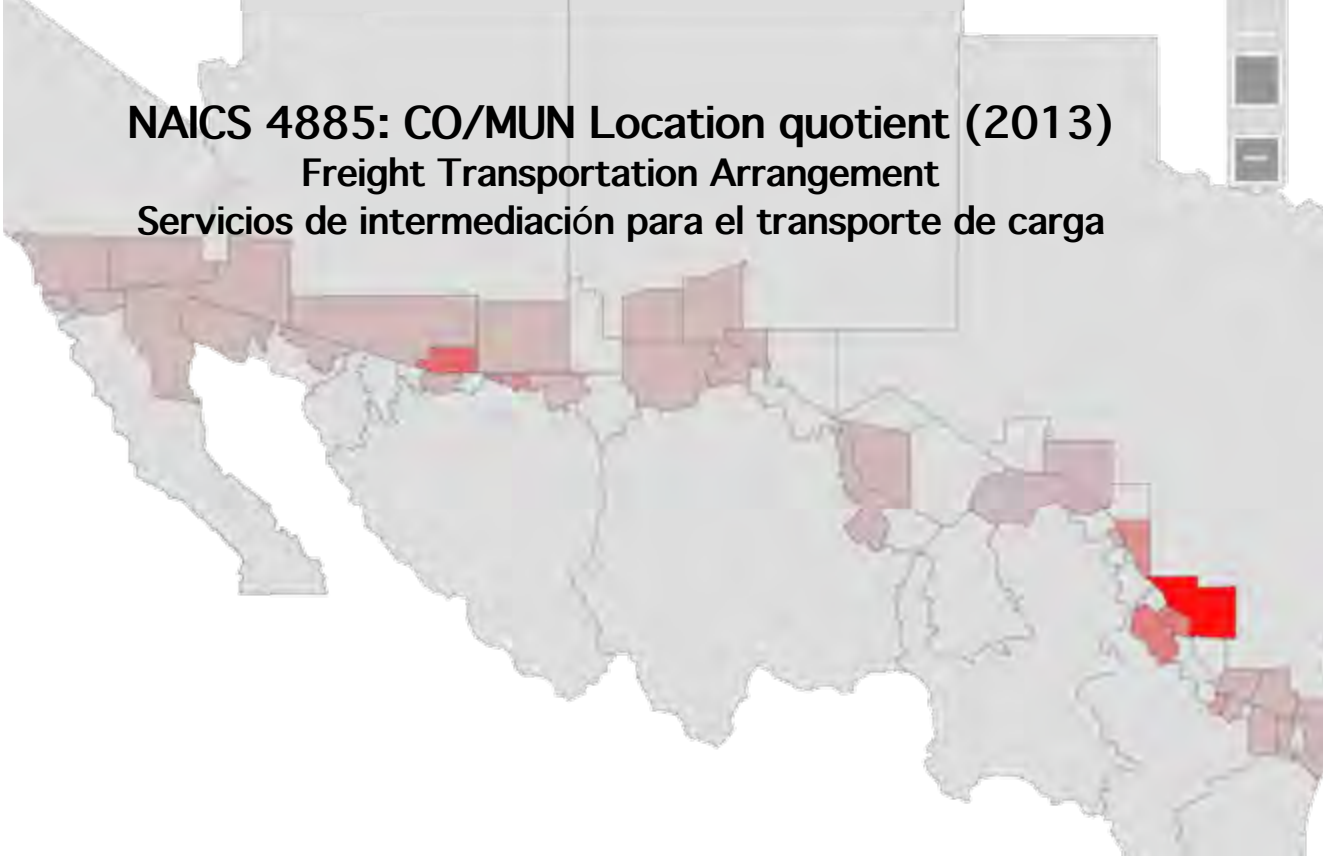
3 Lucinda Vargas, "Maquiladoras: Impact on Texas Border Cities," Federal Reserve Bank of Dallas, June 21, https://www.dallasfed.org/assets/documents/research/border/tbe_vargas.pdf.

4 Jesus Cañas, "A Decade of Change: El Paso's Economic Transition of the 1990s," Business Frontier, Issue 1, El Paso: Federal Reserve Bank of Dallas, El Paso Branch, 2002, https://www.dallasfed.org/assets/documents/research/busfront/bus0201.pdf.

Local universities, including New Mexico State University, the Universidad Autónoma de Ciudad Juárez, the University of Texas at El Paso, among others, can play an important role in supporting cluster-based economic development efforts, as educators, conveners, and researchers. The newly formed Hunt Institute for Global Competitiveness at UTEP is already doing detailed work on the aerospace, automotive, and energy clusters in the region. The Arrowhead Center at NMSU is working closely with Mexico to promote entrepreneurship, and the UACJ has urban planning resources that could be used to better plan the future development of the tri-state binational region (certainly these universities also have many other resources to be leveraged). UTEP has for some time been on the vanguard of binational education, attracting more Mexican students than any other university in the United States. Unfortunately, despite its strong binational orientation, professors and students face strict restrictions on travel across the border into Mexico, limiting the ability to conduct binational programs (a problem faced by many universities across the border region).



Map of the concentration (LQ) of the semiconductor industry in the U.S.-Mexico border region, 2013.

Chapter 4

Coahuila-Nuevo León-Tamaulipas-Texas Border Subregion

Overview

The Texas-Coahuila-Nuevo León-Tamaulipas border subregion has at least three distinct competitive advantages. First, with $280 billion in commerce moving through the Laredo customs district in 2014, the bridges of Laredo-Nuevo Laredo are the busiest commercial crossing point along the U.S.-Mexico border and third busiest in the United States (behind only Los Angeles and New York).[1] This tremendous flow of goods through the region offers nearly endless opportunities to build up the local industry by finding ways to add value to products that are already moving through the area—keeping shipping costs and time low.

Second, but not unrelated, are the major urban economies within a few hours of the Laredo/Nuevo Laredo hub. On the U.S. side of the border, the I-35 corridor passes through San Antonio before making its way up to Dallas and beyond. San Antonio has a diverse and dynamic economy, including important energy, defense, automotive, and financial services industry investments. In Mexico, Nuevo Laredo is just a few hours from the Monterrey/Saltillo metro area, the most important industrial center in northern if not all of Mexico. This means that not only are long-haul binational supply chains very robust in the subregion, so are local supplier networks and business organizations. Nuevo León stands out for its extraordinarily well developed network of business clusters that can serve as a model for other actors in the subregion.

Third, the region has very significant energy resources. In Texas, the Eagle Ford shale formation has developed extremely quickly since 2009, and in Mexico, the 2013 energy reform has opened up opportunities for significant private investment in the Burgos Basin and other formations in Tamaulipas, Nuevo León, and Coahuila. The recent decline in energy prices has slowed the pace of development, which, despite its obvious disadvantages, may allow the communities of northeastern Mexico to better organize and prepare their region to take advantage of the opportunities presented through energy development while managing its challenges.

This subregion, composed of ten *municipios* on the Mexican side and six counties from Texas, present some of the most interesting results in the study. In Coahuila, the subregion includes the *municipios* of Acuña, Guerrero, Hidalgo, Jiménez, Nava, Ocampo, and Piedras Negras. In Nuevo León, the *municipio* of Anáhuac is analyzed, and in Tamaulipas, the *municipios* of Guerrero and Nuevo Laredo are included. On the side of Texas, Kinney, Maverick, Terrell, Val Verde, Webb, and Zapata counties comprise the subregion.

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1 Author's calculation with data from United States Census Bureau, USA Trade Online, accessed 2015.

Concentration

Contrasted to the configuration of other subregions, we found that, for 2009 and 2013, the most concentrated industry belongs to the services sector. The Freight Transportation Arrangement industry attained a location quotient of over twenty points. This means that this industry is twenty times more concentrated in terms of employment locally than it is at the national level. Furthermore, this industry, classified with the NAICS code 4885, is the second largest employer in the region among the most concentrated industries. If we take into account that the General Freight Trucking industry is highly concentrated as well, we can deduce that freight transportation drives the economic development of the subregion to a large extent.

We are certain that the relevance of this sector is closely related to the particular interaction that exists across the border in this subregion, and more specifically, to the great importance of Laredo-Nuevo Laredo as the most important commercial crossing point between Mexico and the United States. As Nuevo Laredo and Webb County are the two geographic areas that concentrate more than half of the total population in the subregion (56.57%), it is evident that the activities that are developed in this area will impact the economic development of the rest of the subregion. In consequence, given that the port of entry in Laredo-Nuevo Laredo is one of the most dynamic in the world, the existence of a highly concentrated freight industry is natural.

Table 1. TX-Coah.-N.L.-Tamps Subregion 20 Most Concentrated (LQ) Industries, 2013

Description and NAICS Code	Employees	LQ
Freight Transportation Arrangement (4885)	13,529	21.5
Motor Vehicle Parts Manufacturing (3363)	49,670	20.7
Household Appliance Manufacturing (3352)	3,539	15.2
Electrical Equipment Manufacturing (3353)	4,983	13.3
Coal Mining (2121)	2,529	12.9
Manufacturing and Reproducing Magnetic and Optical Media (3346)	444	11.0
Audio and Video Equipment Manufacturing (3343)	952	7.6
Semiconductor and Other Electronic Component Manufacturing (3344)	6,260	7.1
Leather and Hide Tanning and Finishing (3161)	303	6.0
Engine, Turbine, and Power Transmission Equipment Manufacturing (3336)	1,379	5.5
Medical Equipment and Supplies Manufacturing (3391)	4,778	5.5
Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing (3334)	1,670	4.9
Commercial and Service Industry Machinery Manufacturing (3333)	862	4.7
General Freight Trucking (4841)	10,576	4.7
Electric Lighting Equipment Manufacturing (3351)	617	4.6
Other Support Services (5619)	2,728	4.2
Lime and Gypsum Product Manufacturing (3274)	187	3.9
Nonmetallic Mineral Mining and Quarrying (2123)	912	3.9
Beverage Manufacturing (3121)	2,387	3.6
Water collection, treatment and supply/ Water Supply and Irrigation Systems (2221 + 22131)	1,141	3.4

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

By necessity, the logistics industries in the United States and Mexico are connected, working with one another on a daily basis to move products from source to destination. In a certain sense, this is one of the most integrated industries identified in the study, coming through with some of the highest levels of concentration in Webb County, Nuevo Laredo, and most of the other entities within the subregion. It is also growing, with truck crossings (see below) and industry employment both up significantly since the recession in 2009. Nevertheless, as we tried to verify the connection between the freight industry in Mexico and in the U.S. during the focus

group conducted at the end of June 2015 in Laredo, TX, we found out that there is limited organizational interaction between the industries on each side of the border to improve the conditions for and competitiveness of regional logistics. In this sense, we identify the logistics industry as a top candidate for binational cluster-based economic development strategies.

Border Crossing in Laredo, TX compared to total entry at Southern Border Ports

Port Name	Year	Trucks	% truck/total
Laredo	2009	1,382,319	32%
Laredo	2013	1,846,282	36%
Total	2009	4,291,465	
Total	2013	5,194,867	

Source: Bureau of Transportation Statistics (2015)

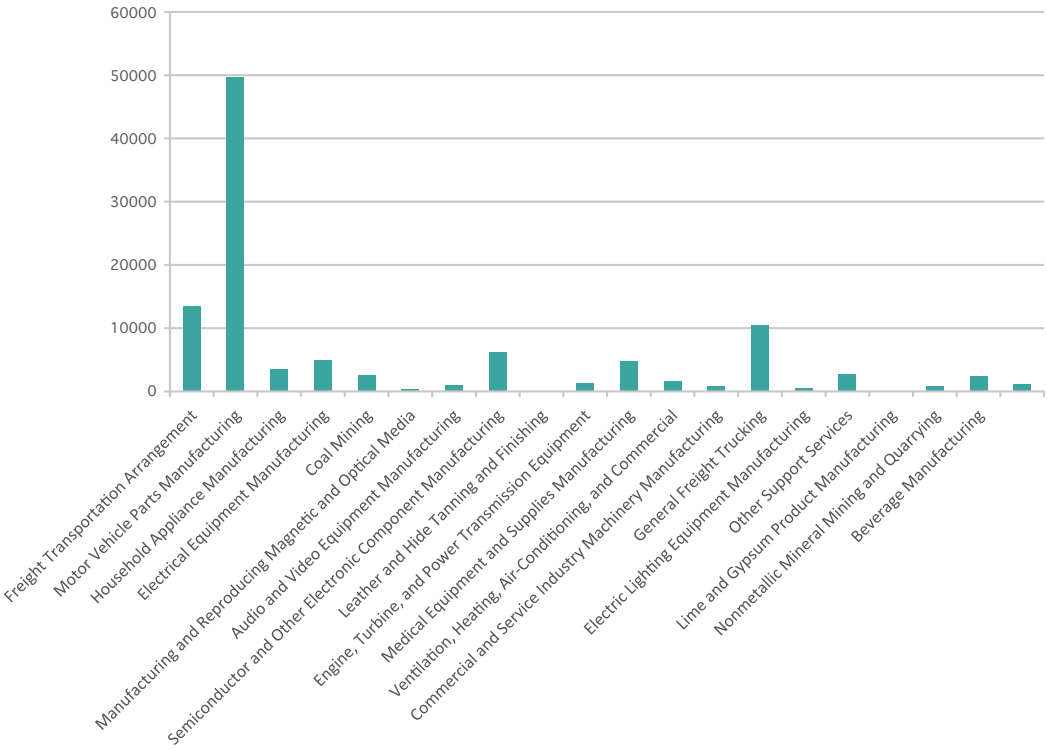
The household appliance manufacturing industry remained concentrated in the region between 2009 and 2013. In 2009, it employed 2910 people while the number of jobs in 2013 for this industry attained 3352, an increase of 127.71%. Most of the employment for the industry is located in Acuña and Nuevo Laredo. Although this industry is not as concentrated in the U.S. side of the subregion as it is in the Mexican municipios, this is an industry that remains important for the economic development of the subregion as a whole.

The oil and gas industry which grew tremendously in south Texas from 2009 to 2013 in order to exploit the Eagle Ford shale, did not show up on list of most dynamic or concentrated binational industries in large part because its growth occurred almost entirely on the U.S. side of the border (and because the industry's growth in the broader U.S. economy was robust). When narrowing the focus to the U.S. side, the importance of the energy sector comes into focus. In Webb County (home to Laredo), oil and gas extraction and support activities for mining (which includes drilling oil and gas wells as well as other service support) are among the most concentrated industries, with respective LQs of 4.2 and 5.6 in 2013. Webb County, as well as other Texan border counties, show employment growth in these industries from 2009-2013.

Another industry that needs to be followed closely is the motor vehicle parts manufacturing industry, which showed an important increase of employment between 2009 and 2013 and whose LQ grew from 14.04 in 2009 to 20.74 in 2013. This concentration in the region is mainly due to the arrangement of the automotive sector in Mexico. Just in Coahuila, almost 13 thousand jobs existed in 2009 within the industry, which is more than half of the total jobs reported for that industry in the region. In 2013, the number of jobs in that industry in Coahuila increased to more than 41 thousand, 83.13% of total employment for the motor vehicle parts manufacturing industry in the region.

As is the case with this industry in other regions analyzed, the parts firms serve the major automotive OEMs that are established in Mexico and the United States and that have made this sector one of the most competitive in the country. In Coahuila, Chrysler and GM each have a plant in Saltillo; Kia is currently constructing an assembly plan in Nuevo León; Toyota has a plant in San Antonio; and there are other manufacturers in the neighboring states that are served by the firms that comprise the parts industry. Given the binational nature of this industry, opportunities exist to strengthen regional synergies in this sector. The employment value of such efforts could be substantial. In Texas, for example, almost 30,000 people are employed in motor vehicle parts manufacturing.[2] Given the strong presence of the industry in the subregion, border communities stand to benefit from engaging in efforts to strengthen the broader Texas-Coahuila-Nuevo León ecosystem.

Figure 1. Employment for the 20 Most Concentrated Industries (LQ), TX-Coah.-N.L.-Tamps Subregion, 2013



Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

2 "The Economic Impact of the Motor Vehicle Parts Manufacturing Industry on the United States", Motor and Equipment Manufacturers Association, January 2013, http://www.mema.org/Document-Vault/PDFs/2013/IHS-Economic-Analysis-2013.pdf.

Dynamism

Due to the strong synergies between the two industries, at times cluster analyses consider motor vehicle parts manufacturing as a part of the same cluster as the aerospace products and parts manufacturing industry. Employees routinely cross-over from the automotive to aerospace industry because of the similarity in skills needed, and the supplier networks, while generally requiring even tighter quality controls in aerospace, are in many ways similar and often overlap, with single companies supplying both industries.

Based on its quick pace of growth, aerospace parts manufacturing earned the highest score in the subregion in the competitiveness index of our shift-share analysis. The industry added some 768 jobs between 2009 and 2013. Its development along the border has been driven by the growth of Alcoa Fastening Systems in Acuña, which has announced further investments in the coming years.[3] Saltillo, Coahuila, San Antonio, Texas, and the state of Nuevo León also have assets in the aerospace industry. Based on the feedback we received at the focus groups, it appears unlikely that significant interaction among these firms currently exists. In 2009 in Nuevo León, six companies, two universities, and two government entities came together to form the Monterry AeroCluster "to promote regional integration for the development of the aerospace sector in the state" and to develop "the incorporation of local suppliers into the value chain."[4] We recommend an effort to bring the aerospace firms in Coahuila and south Texas into dialogue with the already organized cluster in Nuevo León to explore the benefits of cluster organization and the potential for a joint regional agenda. It would also be worthwhile to generate dialogue between the large auto parts industry and the burgeoning aerospace industry within the subregion in order to allow them to define and potentially promote the development of shared resources (infrastructure, educational, etc.).

3 El Economista, "Alcoa invierte en planta en Acuña," June 15, 2015, http://eleconomista.com.mx/estados/2015/06/15/alcoa-invierte-planta-acuna.

4 Monterrey Aerocluster website, http://www.monterreyaerocluster.com/about.php.

Table 2. TX-Coah.-N.L.-Tamps Subregion, Most Dynamic Industries (Shift – Share Analysis, 2009 – 2013)

Description and NAICS Code	Competitiveness Index	Change # Jobs 2009-2013	Employment Growth 2009 – 2013
Aerospace Product and Parts Manufacturing (3364)	76.8	768	7680%
Cable and Other Subscription Programming (5152)	45.5	92	4600%
Coating, Engraving, Heat Treating, and Allied Activities (3328)	39.0	391	3910%
Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing (3334)	22.8	1,600	2286%
Spring and Wire Product Manufacturing (3326)	13.3	199	1327%
Other Food Manufacturing (3119)	13.2	555	1321%
Lime and Gypsum Product Manufacturing (3274)	6.2	161	619%
Iron and Steel Mills and Ferroalloy Manufacturing (3111)	4.9	68	486%
Nonmetallic Mineral Mining and Quarrying (2123)	4.7	748	456%
Sound Recording Industries (5122)	4.1	49	408%
Charter Bus Industry (4855)	4.0	87	435%
Colleges, Universities, and Professional Schools (6113)	4.0	1,648	412%
Psychiatric and Substance Abuse Hospitals (6222)	3.9	8	400%
Other Miscellaneous Manufacturing (3399)	3.3	951	319%
Other Transit and Ground Passenger Transportation (4859)	3.0	245	322%
Other Telecommunications (5179)	2.9	85	293%
Communications Equipment Manufacturing (3342)	2.7	176	244%
Museums, Historical Sites, and Similar Institutions (7121)	2.4	50	250%
Cutlery and Handtool Manufacturing (3322)	1.7	19	158%
Beverage Manufacturing (3121)	1.6	1,493	167%

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

In terms of employment growth and competitiveness, the ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing industry stands out. This industry takes advantage of proximity to the U.S. to produce bulky (and often custom built) and otherwise expensive to ship goods at a economical price close to their final market, usually in the United States. The growth within the subregion was driven by a particularly large increase of employment in this industry in Nuevo Laredo.

Finally, an interesting finding is located in the code created to classify colleges, universities and professional schools, which showed an important increase in employment between 2009 and 2013. The largest changes were noted in Piedras Negras, Coahuila and in Nuevo Laredo, Tamaulipas. As we confirmed in the focus group, collaboration between industry and universities is key for the economic development of the region, so this is a sector that needs significant attention. Investment in many other sectors can be attracted if labor is specialized and fulfills the needs of those industries with need for skilled workers.

Trade and Binationalsim

The Laredo/Nuevo Laredo corridor stands in a class of its own in terms of logistics and commerce, connecting not only the local border communities but also the national economies of the United States and Mexico. Though much more trade flows through the area than simply that of the states comprising the subregion, these states also show a very strong binational orientation. Texas, of course, is the United States' largest exporter to Mexico, and Tamaulipas, Nuevo León, and Coahuila are each important contributors to Mexican exports.

Similar to the other subregions of the border, we find that the manufacturing industries are the most integrated in terms of cross-border trade. The states of Coahuila, Nuevo León, and Tamaulipas each orient a great deal of their production toward sales in the United States. To a lesser—but still very significant extent—Texas also exports manufactured goods across the border. In addition to general manufactured goods, we see particularly high export-to-GDP ratios for textiles as well as apparel and leather. Texas participates in the broader U.S.-Mexico manufacturing platform in significant ways, though this production appears to be centered in the larger urban areas of the state to a greater extent than the border communities themselves.

See Appendices A and B for notes on the interpretation of the values in the trade and GDP tables.

Table 3. Texas GDP and Exports to Mexico by Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to Texas GDP (Million USD)	% of Total TX GDP	Exports Texas to Mexico (Million USD)	% of Total State Exports to MX	Exports to MX/ GDP (%)
Oil and gas extraction (211)	176,895	11.36%	2,429	2.43%	1.37%
Mining, except oil and gas (212)	3,280	0.21%	149	0.15%	4.55%
Wood products manufacturing (321)	1,425	0.09%	153	0.15%	10.73%
Nonmetallic mineral products manufacturing (327)	4,062	0.26%	401	0.40%	9.87%
Furniture and related products manufacturing (337)	1,254	0.08%	289	0.29%	23.05%
Miscellaneous manufacturing (339)	3,111	0.20%	1,666	1.67%	53.54%
Farms (111-112)	9,775	0.63%	1,251	1.25%	12.79%
Forestry, fishing, and related activities (113-115)	1,757	0.11%	30	0.03%	1.70%
Food and beverage and tobacco products manufacturing (311 - 312)	11,438	0.73%	3,214	3.21%	28.10%
Textile mills and textile product mills (313 - 314)	450	0.03%	1,651	1.65%	366.89%
Apparel and leather and allied products manufacturing (315 - 316)	470	0.03%	476	0.48%	101.19%
Paper Manufacturing, Printing and related support activities (322 - 323)	3,840	0.25%	1,726	1.73%	44.96%
Petroleum, plastic and chemical product manufacturing (324 - 326)	117,195	7.53%	28,282	28.27%	24.13%
Primary metals manufacturing, fabricated metal products (331 - 332)	19,043	1.22%	7,739	7.74%	40.64%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	56,140	3.61%	50,575	50.56%	90.09%
State GDP, Subsector Exports	**1,557,193**		**100,030**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Table 4. Coahuila GDP and Exports to the U.S. by Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to Coahuila GDP (Million USD)	% of Total Coahuila GDP	Exports Coahuila to the US (Million USD)	% of Total State Exports to U.S.	Exports to U.S./ GDP (%)
Oil and gas extraction (211)	121	0.30%	0.00	0.00%	0.00%
Mining, except oil and gas (212)	971	2.43%	26	0.10%	2.71%
Wood products manufacturing (321)	20	0.05%	0.02	0.00%	0.08%
Nonmetallic mineral products manufacturing (327)	894	2.23%	76	0.29%	8.51%
Furniture and related products manufacturing (337)	144	0.36%	61	0.24%	42.31%
Miscellaneous manufacturing (339)	40	0.10%	106	0.41%	264.86%
Food and beverage and tobacco products manufacturing (311 - 312)	1,609	4.02%	378	1.46%	23.47%
Textile mills and textile product mills (313 - 314)	92	0.23%	98	0.38%	106.08%
Apparel and leather and allied products manufacturing (315 - 316)	155	0.39%	597	2.30%	385.64%
Paper Manufacturing, Printing and related support activities (322 - 323)	310	0.78%	267	0.10%	8.67%
Petroleum, plastic and chemical product manufacturing (324 - 326)	605	1.51%	462	1.78%	76.36%
Primary metals manufacturing, fabricated metal products (331 - 332)	3,209	8.02%	3,694	14.25%	115.10%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	9,283	23.20%	20,400	78.69%	219.76%
State GDP, Subsector Exports	**40,011**		**25,924**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Table 5. Nuevo León GDP and Exports to the U.S. by Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to Nuevo León GDP (Million USD)	% of Total Nuevo León GDP	Exports Nuevo León to the US (Million USD)	% of Total State Exports to U.S.	Exports to U.S./ GDP (%)
Oil and gas extraction (211)	792	0.92%	0	0.00%	0.00%
Mining, except oil and gas (212)	357	0.42%	20	0.10%	5.54%
Wood products manufacturing (321)	61	0.07%	5	0.02%	7.62%
Nonmetallic mineral products manufacturing (327)	1,211	1.41%	678	3.32%	56.03%
Furniture and related products manufacturing (337)	217	0.25%	73	0.36%	33.57%
Miscellaneous manufacturing (339)	332	0.39%	676	3.31%	203.39%
Food and beverage and tobacco products manufacturing (311 - 312)	4821	5.62%	1,050	5.14%	21.78%
Textile mills and textile product mills (313 - 314)	158	0.18%	50	0.25%	32.01%
Apparel and leather and allied products manufacturing (315 - 316)	283	0.33%	23	0.11%	8.07%
Paper Manufacturing, Printing and related support activities (322 - 323)	645	0.75%	191	0.93%	29.60%
Petroleum, plastic and chemical product manufacturing (324 - 326)	1,981	2.31%	1,605	7.86%	81.02%
Primary metals manufacturing, fabricated metal products (331 - 332)	3,737	4.35%	2,034	9.96%	54.42%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	7,708	8.98%	14,016	68.64%	181.84%
State GDP, Subsector Exports	**85,827**		**20,421**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Table 6. Tamaulipas GDP and Exports to the U.S. by Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to Tamaulipas GDP (Million USD)	% of Total Tamaulipas GDP	Exports Tamaulipas to the US (Million USD)	% of Total State Exports to U.S.	Exports to U.S./ GDP (%)
Oil and gas extraction (211)	3,092	8.67%	337	1.86%	10.89%
Mining, except oil and gas (212)	13	0.04%	0	0.00%	0.00%
Wood products manufacturing (321)	9	0.03%	3	0.02%	34.32%
Nonmetallic mineral products manufacturing (327)	154	0.43%	164	0.91%	106.37%
Furniture and related products manufacturing (337)	58	0.16%	400	2.21%	688.23%
Miscellaneous manufacturing (339)	191	0.54%	1,006	5.57%	526.93%
Food and beverage and tobacco products manufacturing (311 - 312)	686	1.92%	200	1.11%	25.18%
Textile mills and textile product mills (313 - 314)	42	0.12%	27	0.15%	65.48%
Apparel and leather and allied products manufacturing (315 - 316)	58	0.16%	34	0.19%	59.51%
Paper Manufacturing, Printing and related support activities (322 - 323)	103	0.29%	186	1.03%	179.95%
Petroleum, plastic and chemical product manufacturing (324 - 326)	2,297	6.44%	3,134	17.34%	136.43%
Primary metals manufacturing, fabricated metal products (331 - 332)	179	0.50%	746	4.13%	417.14%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	2,180	6.11%	11,841	65.50%	543.22%
State GDP, Subsector Exports	**35,682**		**18,079**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Coahuila-Nuevo León-Tamaulipas-Texas Findings and Recommendations

There is no doubt that logistics industries are the great strength of this subregion. Simple geography may have sparked their creation, but the area has now developed tremendous expertise and resources (physical and other) that allow it to operate in a competitive manner. Its current competitiveness, however, should be understood as a reason to focus attention on its future development and improved productivity, not as a justification for taking the industry for granted. As a truly binational cluster of industries, the transportation and customs firms of Laredo-Nuevo Laredo should explore the potential gains to be had by forming, along with government and educational institutions, a binational cluster group.

In this region, Texas A&M International University has, through its Binational Center, has taken on an important role in connecting key economic actors throughout the subregion. Whereas in other border subregions business coalitions (i.e. chambers of commerce, economic development organizations, mega-region groups) have taken on the role as the key conduit for cross-border and subregion-wide business ties, TAMIU has filled this role for the greater Laredo area and the Coahuila-Nuevo León-Tamaulipas-Texas subregion. Given its demonstrated regional outlook in terms of education and as a community stakeholder, TAMIU appears well positioned to play a key role in fomenting the development of binational cluster groups across several relevant industries.

The energy sector has become extremely important to the south Texas economy over the past several years. It has also become organized, forming the South Texas Energy & Economic Roundtable and the Eagle Ford Consortium, among others. With energy reform in Mexico and the geological similarities between south Texas and northeastern Mexico, there is now an opportunity to regionalize the approach. Already, Coahuila has formed the Clúster Minero-Petrolero de Coahuila, which brings together government, business, and educational institutions to promote the orderly development of the petroleum and mining industries in the state. While the mining sector is already well developed, the focus on energy is largely forward looking. Given the experience and capital of south Texas communities and companies in managing and promoting the growth of the energy industries, it makes sense to promote continued and deepened collaboration among the industry and cluster groups.

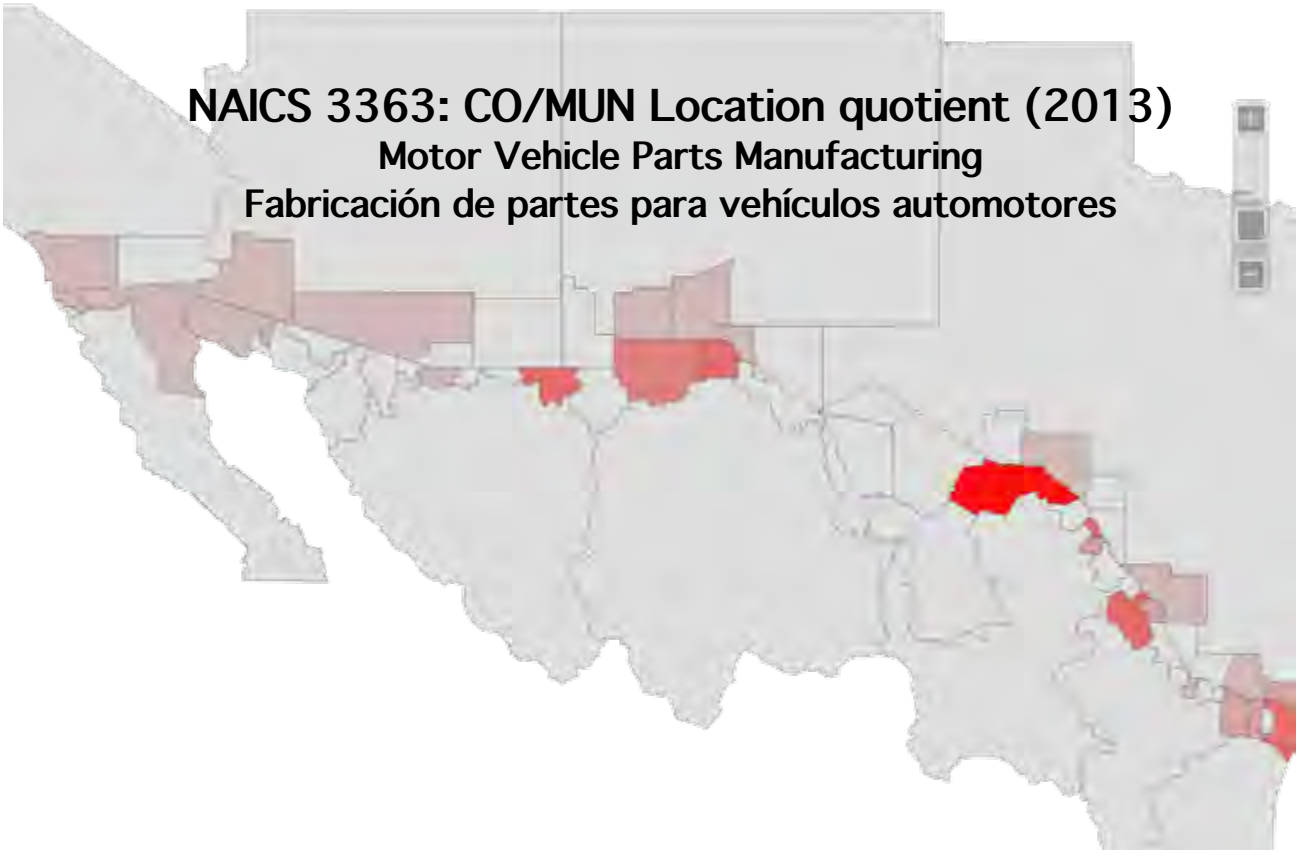
Finally, the case of Nuevo León offers lessons not only for the subregion but for the border region in general in terms of effective cluster-based organization. The state has formed the

Consejo Estatal de Clústeres de Nuevo León—the State Council of Clusters. The council is comprised of twelve cluster groups:[5]

- Software Council of Nuevo León (csoftmty)
- Cluster Monterrey City of Health
- Automotive Cluster of Nuevo León
- Nanotechnology Cluster of Nuevo León
- Biotechnology Cluster of the State of Nuevo León
- Electrodomestics Cluster of Nuevo León
- Monterrey Aerocluster: Aerspace Cluster of Nuevo León
- Agri-food Cluster of Nuevo León
- Housing Cluster
- Monterrey Interactive Media & Entertainment Cluster
- Transport and Logistics Cluster of Nuevo León
- Tourism Cluster of Nuevo León

The model of a cluster council that brings together several organized clusters, each of which have the participation of government, educational institutions (four universities participate), and the private sector, facilitating their joint role in regional development, is a very interesting one, and it is certainly worth exploring the potential of its replication at the level of binational mega-regions. Several of the industries identified as important and competitive in the subregion are organized as clusters within the state of Nuevo León. We recommend that leaders in industry, government, and education open a dialogue with the relevant clusters in Nuevo León to explore potential collaboration and to explore the potential benefits of cluster-based organization at the binational, subregional level.

5 Nuevo León State Council of Clusters website, http://cecnl.mx/catalogo.php.



Map of the concentration (LQ) of motor vehicles parts manufacturing in the U.S.-Mexico border region, 2013.

Chapter 5

Lower Rio Grande Valley-Tamaulipas Border Subregion

Overview

The cities along the lower portion of the Rio Grande/Río Bravo river valley in Texas and Tamaulipas make up the geographically largest corridor of urban areas along the U.S.-Mexico border. While the individual communities never reach the size of the larger twin-city pairs along the border, at 2.5 million, the combined the population of this subregion is second among the border subregions analyzed in this study, only behind California-Baja California. This concentration of population provides a strong workforce for manufacturing and other industries, an asset that can be strengthened and harnessed by improving educational opportunities and capitalizing on the opportunities to connect educational institutions with companies in the subregion through cluster-based economic development efforts.

This subregion is comprised of the Texas counties of Cameron, Hidalgo, and Starr, as well as the Tamaulipas *municipios* of Camargo, Gustavo Díaz Ordaz, Matamoros, Mier, Miguel Alemán, Reynosa, and Río Bravo. Major regional assets include the large manufacturing industries of Reynosa and Matamoros; access to the Gulf of Mexico, with investments in ports at both Brownsville and Matamoros underway; energy production and transportation opportunities; and a climate that has allowed the production of a variety of agricultural products, including beef, vegetables, citrus, and grains.

Important efforts are underway to bring together actors throughout the subregion, largely through an effort known as BiNED, or Binational Economic Development. BiNED was created in 2014 with the participation of the mayors of Brownsville, Harlingen, and Matamoros, with the support of U.S. Congressman Filemon Vela. In 2015, it was expanded to include Reynosa, Edinburg, and McAllen, as well as representation from Cameron and Hidalgo counties.[1] Two local economic development organizations, United Brownsville and the McAllen EDC, are helping to spearhead the effort. Shortly after the August 2015 ceremony to officially launch the expanded BiNED, Mike Gonzalez wrote:

"BiNED is the entire Rio Grande Valley on both sides of the U.S.-Mexico border, working together to develop and implement one unified advanced manufacturing strategy to create higher paying jobs and help raise our region out of poverty. Every year BILLIONS of dollars pass through our communities through the maquiladoras; but that is the problem, the billions simply pass through our 'pass-through' economy. BiNED and the collaborative projects it will initiate will focus on capturing more of this opportunity in the form of local salaries." —Mike Gonzalez, Executive Director, United Brownsville[2]

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1 Steve Taylor, "Updated: Eight Governmental Entities Sign Expanded BiNED Agreement," *Rio Grande Gaurdian*, August 21, 2015, http://riograndeguardian.com/bined-to-be-expanded-at-ceremony-in-harlingen-today/.

2 Mike Gonzalez, "The RGV is united like never before," United Brownsville website, August 23, 2015, http://unitedbrownsville.com/the-rgv-is-united-like-never-before/.

Concentration

Using Location Quotients, we measured the concentration of industries in the Lower Rio-Grande Valley-Tamaulipas subregion. The audio and video equipment manufacturing industry has proven itself to be highly competitive and warrants special attention. In both, 2009 and 2013, this industry was the most concentrated in terms of employment, with LQ values of 39.9 in 2009 and of 48.9 in 2013. Moreover, the industry showed employment growth in the period analyzed, creating approximately 600 jobs. This industry is largely connected to the automotive cluster in the region, with companies such as Panasonic or Fujitsu Ten, both of which produce audio systems and other electronics for use in vehicles, located in the area. Employment is concentrated predominately in Reynosa, with an important contribution from Matamoros as well; no jobs in the industry are presently registered on the U.S. side of the border.

In terms on employment, the motor vehicle parts manufacturing industry stands out among the most concentrated industries as the top job producer (especially when we take into consideration associated jobs in electronics and audio visual equipment). Given the fact that this industry has a strong presence in other states of Mexico and the United States, it is understandable that it does not present the highest LQ levels. Nevertheless, the industry employed more than 44,000 workers in 2013, a 36% increase from 2009, adding more than 10,000 jobs. Again, as a result of its larger base and robust growth throughout North America in the time period studied, we do not find the auto parts industry as a top industry in our study of the most dynamic industries in the subregion, but we find a smaller related industry from the automotive cluster, motor vehicle body and trailer manufacturing, which more than doubled in size from 2009 to 2013, reinforcing the finding that the broader cluster is both concentrated and dynamic. The bulk of the auto industry jobs are similarly located on the Mexican side of the border, but over 800 jobs are located in Cameron and Hidlalgo Counties. With various OEMs already located in Texas and northeast Mexico and other arriving, such as KIA Motors, this is a cluster with demonstrated potential on both sides of the border and is clearly deserving of special cluster-based economic development attention.

The communications equipment manufacturing industry is the second most concentrated industry in the region and is a large employer, supporting more than 16,000 jobs. Reynosa again presents the highest concentration of labor in the region for this industry, with companies such as Nokia (recently bought by Microsoft), situated in this area, but Matamoros is also quite significant, and a small number of related jobs are found on the U.S. side of the border.

Interestingly, during the analysis we found out that industries such as home health care services and Individual and Family Services are not only highly concentrated but that they employ a large share of population among the most concentrated industries. Employment in these industries is mostly concentrated in the Hidalgo and Cameron counties. A closer analysis of these industries is needed to determine the extent to which concentration in

these industries could be appropriately interpreted as competitiveness (or whether it is better understood as a result of demographic and development in the region) and be utilized to boost economic development in the region.

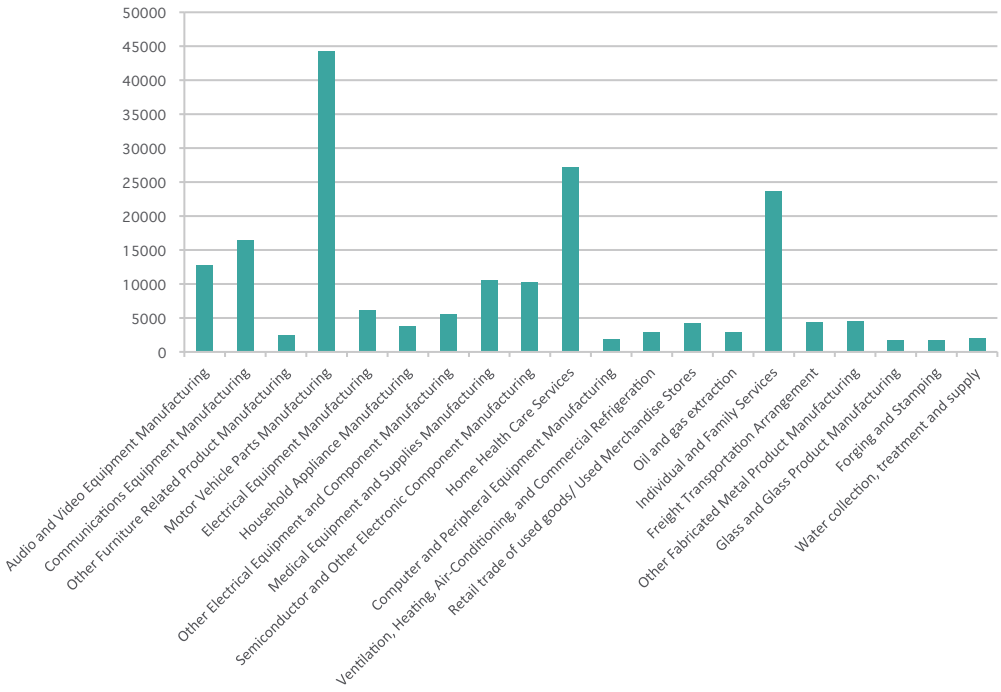
As is the case along much of the border, the local freight transportation arrangement industry is highly concentrated. The recent inauguration and opening of the West Rail ByPass, the first new U.S.-Mexico rail crossing to be built since the era of the Mexican Revolution more than 100 years ago, significantly expands logistics capacity and presents the subregion with an opportunity. Importantly, transportation assets should not be understood simply as a way to attract trade flows *through* the subregion—they should also be taken advantage of as a way to attract trade flows *to* the subregion, attracting and expanding local firms with the capacity to add value to those supply chains.

Table 1. Lower Rio Grande Valley - Tamaulipas Subregion 20 Most Concentrated (LQ) Industries, 2013

Description and NAICS Code	Employees	LQ
Audio and Video Equipment Manufacturing (3343)	12,664	48.9
Communications Equipment Manufacturing (3342)	16,340	23.5
Other Furniture Related Product Manufacturing (3379)	2,361	11.1
Motor Vehicle Parts Manufacturing (3363)	44,277	9.0
Electrical Equipment Manufacturing (3353)	6,111	7.9
Household Appliance Manufacturing (3352)	3,681	7.6
Other Electrical Equipment and Component Manufacturing (3359)	5,452	6.7
Medical Equipment and Supplies Manufacturing (3391)	10,465	5.8
Semiconductor and Other Electronic Component Manufacturing (3344)	10,286	5.7
Home Health Care Services (6216)	27,132	4.8
Computer and Peripheral Equipment Manufacturing (3341)	1,908	4.4
Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing (3334)	2,908	4.1
Retail trade of used goods/ Used Merchandise Stores (4664+4533)	4,169	4.0
Oil and gas extraction (2111)	2,917	3.5
Individual and Family Services (6241)	23,592	3.4
Freight Transportation Arrangement (4885)	4,357	3.3
Other Fabricated Metal Product Manufacturing (3329)	4,428	3.2
Glass and Glass Product Manufacturing (3272)	1,702	3.1
Forging and Stamping (3321)	1,685	3.0
Water collection, treatment and supply (2221+22131)	2012	2.89

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Figure 1. Employment for the 20 Most Concentrated Industries (LQ), Lower Rio Grande Valley - Tamaulipas Subregion, 2013



Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Dynamism

Because of the benefits of concentration, or agglomeration, of firms and industry assets, the location quotient results can be understood an one way to measure industry competitiveness. Another way to evaluate the competitiveness of an industry in a region is to look at its performance over time. Those industries that are growing fast—particularly those that are growing significantly faster than the industry is growing in the broader economy—can be understood to be competitive. Whether due to changes in the market or improved productivity, something is allowing the local firms to have increased success. The competitiveness index derived from a shift-share analysis measures just that—the employment growth of an industry compared to employment growth in the broader economy.

Through that analysis, we found the production of materials to be particularly dynamic (if still small) in the subregion. Aluminum production and processing topped the list, growing more than sixteen-fold and adding 340 jobs between 2009 and 2013. The production of synthetic fibers showed similarly robust growth. As these industries' products are much more likely to be inputs for other industries than final goods, further research is warranted to identify the cluster in which these industries participate and the opportunities that may exist for further organization and or development of the cluster.

Software publishing is another interesting burgeoning industry in the region. While we were not able to find reliable information on many of the specific firms operating in the area, software publishers often work to translate, sell, and/or license the use of software for markets abroad, meaning these may be companies adapting and exporting software developed in the United States to Mexico. The bilingual-bicultural nature of the border community may prove to be a particular advantage in this regard, and further research on this industry is also warranted. This service industry is primarily located in Cameron County, with a small presence in Hidalgo County as well.

Finally, the significant growth in college, university, and professional school employment was driven by increases in Matamoros and Reynosa, appears to be a good sign for the future competitiveness of the regional workforce.

Table 2. Lower Rio Grande Valley-Tamaulipas Subregion, Most Dynamic Industries (Shift – Share Analysis, 2009 – 2013)

Description and NAICS Code	Competitiveness Index	Change # Jobs 2009-2013	Employment Growth 2009 - 2013
Alumina and Aluminum Production and Processing (3313)	16.1	340	1619%
Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing (3252)	10.5	106	1060%
Software Publishers (5112)	5.8	60	600%
Urban Transit Systems (4851)	5.6	1,751	558%
Animal Food Manufacturing (3111)	5.1	50	500%
Natural Gas Distribution/ Gas supply through mains to final consumers (2212 + 2222)	5.0	50	500%
Other Support Activities for Transportation/ Other services related to transportation (4889)	3.1	61	277%
Other Transit and Ground Passenger Transportation (4859)	3.0	578	319%
Forging and Stamping (3321)	3.0	1,265	301%
Office Furniture (including Fixtures) Manufacturing (3372)	2.1	911	201%
Commercial and Industrial Machinery and Equipment Rental and Leasing (5324)	1.9	1,385	205%
Insurance Carriers (5241)	1.8	835	175%
School and Employee Bus Transportation (4854)	1.6	32	160%
Coating, Engraving, Heat Treating, and Allied Activities (3328)	1.3	789	144%
Local Messengers and Local Delivery (4922)	1.2	80	107%
Motor Vehicle Body and Trailer Manufacturing (3362)	1.1	347	137%
Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing (3334)	1.1	1,565	117%
Fabric Mills (3132)	1.1	10	100%
Colleges, Universities, and Professional Schools (6113)	1.1	2,132	122%
Engine, Turbine, and Power Transmission Equipment Manufacturing (3336)	1.1	208	109%

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Trade and Binationalsim

As described in previous chapters, trade data can help us understand to what extent the industries we are analyzing are export oriented and focused on binational opportunities. Unfortunately, this data is only available at the state level and the more general subsector level (3-digit NAICS), so the ability to confidently describe the state of local industry, especially for a state like Texas that has several large population centers further away from the border, is limited. Nonetheless, some relevant observations can be made by looking at the size of production across the traded subsectors, the value of exports to Mexico, and then by comparing the two. See Appendix B for more details regarding the data presented in the trade tables and its interpretation.

In Table 3, we see that though oil and gas production and the development of petroleum-based products and synthetic materials contribute quite significantly to state GDP, the subsectors including more complex manufactured goods are by far the largest contributor to Texas exports to Mexico. This is good news for Texan border communities seeking to boost their participation in the supply chains running through them, as it signals the already significant success of Texas manufacturing firms in connecting to Mexican supply chains and markets. Textile producers, while a relatively small portion of the overall economy, rely heavily on exports to Mexico and its apparel industry.

In Tamaulipas (see Table 4), we see an even greater orientation toward the U.S.-market—this reinforces the well-known finding that proximity to the U.S. market is an extraordinarily important asset in the development of Mexican border communities. All of the important manufacturing industries described in the previous sections come under categories showing a strong participation in exporting to the United States. This underscores the potential for binational partnerships in manufacturing and suggests that the key to building these partnerships lies in closely analyzing the areas in which U.S. border communities have assets they can leverage to contribute to the already strong, dynamic, and binational manufacturing sector on the Mexican side of the border.

See Appendices A and B for notes on the interpretation of the values in the trade and GDP tables.

Table 3. Texas GDP and Exports to Mexico by Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to Texas GDP (Million USD)	% of Total TX GDP	Exports Texas to Mexico (Million USD)	% of Total State Exports to MX	Exports to MX/ GDP (%)
Oil and gas extraction (211)	176,895	11.36%	2,429	2.43%	1.37%
Mining, except oil and gas (212)	3,280	0.21%	149	0.15%	4.55%
Wood products manufacturing (321)	1,425	0.09%	153	0.15%	10.73%
Nonmetallic mineral products manufacturing (327)	4,062	0.26%	401	0.40%	9.87%
Furniture and related products manufacturing (337)	1,254	0.08%	289	0.29%	23.05%
Miscellaneous manufacturing (339)	3,111	0.20%	1,666	1.67%	53.54%
Farms (111-112)	9,775	0.63%	1,251	1.25%	12.79%
Forestry, fishing, and related activities (113-115)	1,757	0.11%	30	0.03%	1.70%
Food and beverage and tobacco products manufacturing (311 - 312)	11,438	0.73%	3,214	3.21%	28.10%
Textile mills and textile product mills (313 - 314)	450	0.03%	1,651	1.65%	366.89%
Apparel and leather and allied products manufacturing (315 - 316)	470	0.03%	476	0.48%	101.19%
Paper Manufacturing, Printing and related support activities (322 - 323)	3,840	0.25%	1,726	1.73%	44.96%
Petroleum, plastic and chemical product manufacturing (324 - 326)	117,195	7.53%	28,282	28.27%	24.13%
Primary metals manufacturing, fabricated metal products (331 - 332)	19,043	1.22%	7,739	7.74%	40.64%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	56,140	3.61%	50,575	50.56%	90.09%
State GDP, Subsector Exports	**1,557,193**		**100,030**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Table 4. Tamaulipas GDP and Exports to the U.S. by Subsector (3-digit NAICS), 2013

Subsector	Subsector Contribution to Tamaulipas GDP (Million USD)	% of Total Tamaulipas GDP	Exports Tamaulipas to the US (Million USD)	% of Total State Exports to U.S.	Exports to U.S./ GDP (%)
Oil and gas extraction (211)	3,092	8.67%	337	1.86%	10.89%
Mining, except oil and gas (212)	13	0.04%	0	0.00%	0.00%
Wood products manufacturing (321)	9	0.03%	3	0.02%	34.32%
Nonmetallic mineral products manufacturing (327)	154	0.43%	164	0.91%	106.37%
Furniture and related products manufacturing (337)	58	0.16%	400	2.21%	688.23%
Miscellaneous manufacturing (339)	191	0.54%	1,006	5.57%	526.93%
Food and beverage and tobacco products manufacturing (311 - 312)	686	1.92%	200	1.11%	25.18%
Textile mills and textile product mills (313 - 314)	42	0.12%	27	0.15%	65.48%
Apparel and leather and allied products manufacturing (315 - 316)	58	0.16%	34	0.19%	59.51%
Paper Manufacturing, Printing and related support activities (322 - 323)	103	0.29%	186	1.03%	179.95%
Petroleum, plastic and chemical product manufacturing (324 - 326)	2,297	6.44%	3,134	17.34%	136.43%
Primary metals manufacturing, fabricated metal products (331 - 332)	179	0.50%	746	4.13%	417.14%
Machinery Manufacturing, Computer and Electronic Product Manufacturing, Electrical Equipment, Appliance, and Component Manufacturing and Motor vehicles, bodies and trailers, and parts manufacturing (333 - 336)	2,180	6.11%	11,841	65.50%	543.22%
State GDP, Subsector Exports	**35,682**		**18,079**		

Authors' own elaboration. See Appendices A, B, and C for information on methodology and data sources.

Lower Rio Grande Valley - Tamaulipas Findings and Recommendations

Crossborder interactions—familial, social, commercial, educational—are a constant in this (and many) border subregion. In terms of economic development, McAllen and Reynosa should be recognized for their significant history of cooperation in efforts to attract manufacturers to their binational area. What is new in this area, however, is the so far very successful effort to bring together all of the key players in this binational subregion to work cooperatively. The BiNED effort is still very much in its infancy, but it has great potential.

Based on our analysis, we recommend exploratory meetings among leaders from all the most concentrated industries—or clusters of industries—in the subregion that include a presence, however small, of firms on both sides of the border. The goal would be to analyze the potential of a sustained engagement with each other and with government and educational institutions to promote binational development of the industry. The automotive cluster stands out as an obvious place to begin, given its size and the participation of a diverse range of industries.

The aerospace industry, despite the fact that it did not show up in the top 20 lists of the most concentrated or dynamic industries, is also worthy of some attention for several reasons. First, it does have a modest but important footprint in both Cameron and Hidalgo counties with more than 300 jobs in each. While the Mexican side of this subregion has not yet registered jobs in the aerospace parts industry, its very strong participation in auto parts suggests there are local assets—skilled workers and managers, firms with the capacity to become suppliers—that could be leveraged to build one. In 2014, civilian aerospace and space transport company SpaceX announced its decision to make an initial investment of $85 million dollars (support 300 jobs) to build a rocket launch site and related facilities near Boca Chica Beach in Cameron County.[3] While this has obvious benefits in terms of direct investment, it also has the potential to attract additional tourists and be leveraged to generate educational opportunities for local students. In the long-term, the most important impact may be its ability to attract a supplier base and fuel the subregion's participation in the broader industry. SpaceX already has a rocket-making plant in central Texas, and if the company is successful, future opportunities to develop the supply chain will certainly exist. They are not, however, guaranteed to land in the subregion, which will have to compete with other attractive locations both near and far. Significant efforts will be needed to fully capitalize on the opportunity.

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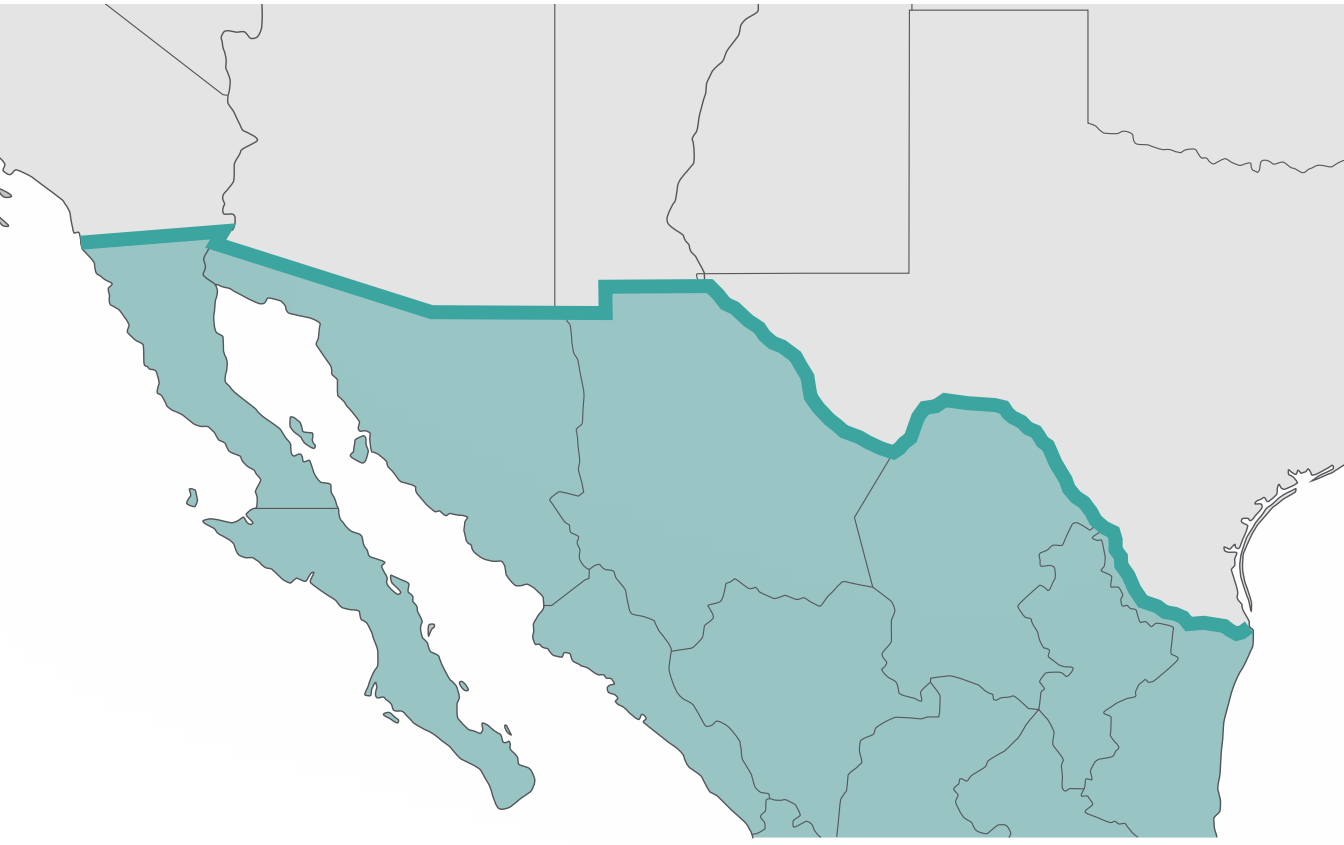
3 Brownsville Chamber of Commerce, "Research and space exploration to raise Cameron County's economic development," October 22, 2014, http://brownsvillechamber.com/research-and-space-exploration-to-raise-cameron-countys-economic-development/.

The oil and gas extraction and transporation industries are also likely to present opportunities for growth in the coming years. In the quantitative analysis, we actually found a decrease in oil and gas extraction employment between 2009 and 2013. Nevertheless, there are many signs that indicate that this industry will grow in importance in the following years. Tamaulipas remains one of the most important states in terms of oil and gas extraction in Mexico, with additional investments expected in the area over the next several years as a result of the opening of Mexico's energy sector and the construction of Puerto Matamoros with a terminal for the use of PEMEX. Cheniere Energy is developing a natural gas export terminal just north of the subregion in Corpus Christi, Texas, and projects to do the same in the subregion have been proposed. Whether or not those specific projects materialize, the abundance of energy development in and around the subregion provide a range of opportunities for manufacturers and infrastructure firms.

Finally, transportation infrastructure improvements are making the subregion evermore attractive for commerce, materials production, and complex manufacturing. The opening of the West Rail ByPass in 2015, as well as the projects to improve the Port of Brownsville and construct a port just south of Matamoros, will give a wide range of industries an enhanced competitive edge, cutting logistics costs for companies in the area and strengthening incentives to attract new investments to the subregion. In August, 2015 the Port of Brownsville completed construction of its new marine cargo dock and storage yard.[4] The Port of Matamoros project is oriented toward the energy industry, facilitating exploration and drilling in the Gulf of Mexico.

4 Eric Kulisch, "Port of Brownsville completes dock expansion," American Shipper, August 10, 2015, http://www.americanshipper.com/Main/News/Port_of_Brownsville_completes_dock_expansion_61139.aspx.



Conclusion

One of the things that stand out from our conversations with stakeholders across the border, and from the analysis contained in this report, is that there is potential to build much more cross-border economic activity than what currently exists. The concentration and unique mix of human capital, specialized firms, and other economic assets on either side of the border are being severely sub-utilized, in large part because of the obstacles presented by the border itself. Although cross-border conurbations are well recognized, and there is evidence of some integration of local economic activity, in many ways the border economies appear to be split in half. The transborder subregions analyzed in this report are home to a huge bilingual, bicultural workforce, numerous high-quality research universities, and a density of manufacturing assets hard to find anywhere else, but attempts to truly integrate the two sides of the border in a unified economic development effort that takes all these assets into consideration have been quite limited. Imagine if a line were to be drawn down through the middle of Silicon Valley and up into San Francisco Bay, with the line representing significant barriers to travel and commercial operations. What would happen if you told professors at UC Berkeley they could not travel to meet and work with their colleagues at Stanford, or if you told Apple they could not hire people living on the other side of town because the yearly visa limit had already been reached, or if a passport and security checkpoint were installed at the Bay Bridge? The culture of innovation for which the region is known would be fragmented and its competitiveness significantly degraded.

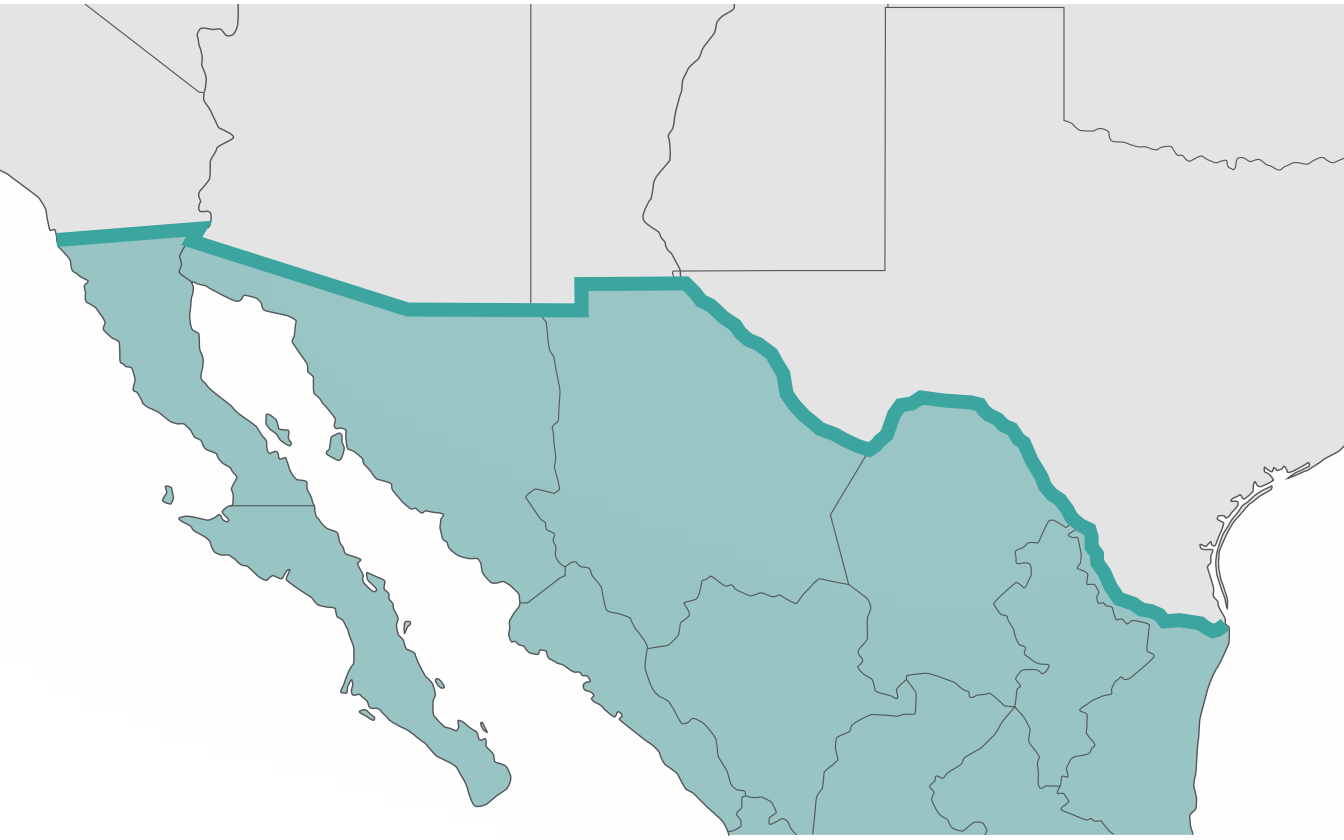
At the border, these measures were not imposed from one day to the next, but rather over several decades. Thus, the economies have not fractured (perhaps somewhat after September, 2001), they simply never fully integrated in the first place, at least not in the modern era of transnational value chains. In this sense, the border has functioned as an obstacle to commerce and regional economic development, and the border region has not been able to reach its full economic potential. The challenge, but also the opportunity, therefore lie in connecting border communities in a way that fully leverages the significant assets on each side of the border. Since we know the line is not going away any time soon, the process of integration will never develop as naturally as it did across the Bay Area. Instead, it will have to be built. Thankfully, recent developments in supply chain management, telecommunications, teleworking, and distance learning make it more possible than ever to connect border communities.

Most important, though, is generating and sustaining the will to engage. Transborder economic development efforts are vitally important to border communities, and we are seeing more and more of them throughout the border region. Government, educational institutions, and businesses must all create platforms for engagement robust enough to overcome border barriers. Pursuing collaborative cross-border strategies as a part of cluster-based economic development has particular potential to leverage local knowledge and help border community economies develop to their fullest potential beyond their current status as tran-

sit points and "pass-through" communities. We have proposed the development of transborder cluster groups and the creation of subregional cluster councils as a method to advance cooperative approaches to strengthening regional competitiveness, identifying significant opportunities for crossborder cluster-based economic development in the aerospace, automotive, medical devices, energy, and logistics industries, among others.

The opportunity, however, is about much more than simply mitigating the negative externalities associated with the border. The borderline, dividing the United States and Mexico, may have created divergence in the economic paths of the two sides, but at this point rather than lament this division we should take advantage of the diversity it has generated. Border communities can offer industries a unique value proposition. It used to be that Mexico had *low* labor costs, making it a good place to do basic, low-value-add assembly. Wages and skills are up, but Mexico still has *lower* labor costs, making Mexico a good place to do skilled manufacturing and increasingly also significant design and engineering work. The United States has lower costs for energy and capital, as well as a competitive regulatory environment and an abundance of highly skilled workers and entrepreneurs. Of course, the great advantage for all is the proximity to the huge North American market, giving the region access to lower shipping costs and quicker time to market than offshore producers.

To fully capitalize on the value proposition, border communities must communicate, collaborate, and minimize the costs of connection. This means working with the federal governments to ensure the objectives of border security and efficiency are met simultaneously and without one impeding the other, but it also means significantly enhancing local level crossborder cooperation.



Appendices

Appendix A: Methodology

Industrial Agglomeration- Location Quotient

The location quotient was the measure chosen in this study to calculate the level of specialization of different industries in the different regions analyzed. This measure, very straightforward to calculate and to interpret, determines how concentrated is an industry in a region in terms of employment compared to a larger geographic area. Its value lies in the fact that it allows us to understand the economic configuration of a region.

$$LQ = \left(\frac{\frac{E_i^j}{E^j}}{\frac{E_i^n}{E^n}} \right)$$

i= industry
j=region
n=reference geographical area

For this study, we calculated location quotient values at two different levels. On one hand, we constructed LQ values for the municipios and counties considered in the study. On the other hand, we calculated LQ values at the subregional level for each of the five subregions analyzed. In the former case, our reference geographical area was total employment at the national level. In the second stage, the geographical area of reference was the sum of total employment for both countries.

To develop the analysis, two years were considered in the study: 2009 and 2013. For data on employment in Mexico, we used the Economic Census 2009 and 2014 (see Appendix C for more details on data sources) and the County Business Patterns series for 2009 and 2013, in the case of the United States. As a large share of the data on employment in the United States is confidential and it is reported by using ranges, we used midpoints of those ranges for the analysis. Robustness was tested adjusting those midpoints to match total employment by industry at the state level; results hold.

Matching the information on employment by industry was possible given that Canada, the United States and Mexico created the North American Industry Classification System (NAICS) to allow some level of industrial standardization among the three countries. We developed the study using 4-digit NAICS codes, used for industries. When conducting the analysis at the binational level, some industries did not share the same NAICS code. In that case, we tried to find a matching code whenever a specific industry initially appeared as being highly concentrated.

Binational Analysis- Trade and Output

To conduct the analysis on how binational industries are along the border of the United States and Mexico, we used two different types of measures: GDP and trade. In both cases, three-digit NAICS codes data (subsectors) was used, as it was the most detailed level of data available.

It is important to take into account that data on exports and GDP is not available for all the subsectors that compose a state economy. Nevertheless, we included Total State GDP for readers to clearly verify the relevance of the subsectors mentioned in the study in the the state economy. In the case of exports, although there are some subsectors not included here, the disparity is minimal, so total exports correspond to the total monetary amount of exports for the subsectors included in the analysis; percentages are calculated accordingly. More details about this can be found in Appendix B and Appendix C.

As data on exports to the United States is not available at the state level in Mexico, we used a conservative approach where the percentage of Mexican exports for 2009 and 2013 was used as the percentage of exports for the states included in the study.

The data used in for this part of the analysis demonstrates how output-intensive different subsectors are in the states where the *municipios* and counties analyzed are located. Moreover, we were able to see how these subsectors interact at the binational level. Finally, we linked the most concentrated industries at the subregional level to the corresponding levels of production and binational trade of their subsectors, to verify if there was some visible connection between those trends.

Dynamism- Shift-Share Analysis

To identify the most dynamic industries along the border between 2009 and 2013, we used a tool known as shift-share analysis, which depicts the behavior of the industries that shape a region. To do so, the analysis is broken down into three components:

National Share Component

$$NS_{ij}^{t} = E_{ij}^{t-1} * \left(\frac{E_{n}^{t}}{E_{n}^{t-1}} - 1 \right)$$

i= industry
j=region
n=reference geographical area
t= 2013
t-1= 2009

This component explains the change in employment resulting from the national economic growth.

Industry Mix Component

$$IM_{ij}^{t} = E_{ij}^{t-1} * \left[\left(\frac{E_{in}^{t}}{E_{in}^{t-1}} \right) - \left(\frac{E_{n}^{t}}{E_{n}^{t-1}} \right) \right]$$

This component of the equation determines how many jobs were created because of the industrial configuration of the region and their differences with national growth rates.

Regional Shift Share

$$RS_{ij}^{t} = E_{ir}^{t-1} * \left[\left(\frac{E_{ij}^{t}}{E_{ij}^{t-1}} \right) - \left(\frac{E_{n}^{t}}{E_{n}^{t-1}} \right) \right]$$

Considered as the most important component, the regional shift share indicates how many jobs were created as a result of the region's competitiveness and helps to identify what industries are leading the way of the economic development of the region and which ones are lagging behind.

Shift share

$$\Delta E_{ij} = NS_{ij}^{t} + IM_{ij}^{t} + RS_{ij}^{t}$$

The total sum of the components adds up to the total difference of employment between the two periods.

In addition to the shift-share analysis, we looked at employment growth in the different industries that are present within the regions.

Appendix B: State Trade and GDP Measures and Compatability

When analyzing the relationship between trade and GDP it is important to keep in mind that this part of the study contains data at the subnational level, and that each state has its own interactions with other states and countries. Moreover, it is necessary to take into account that the analysis is done at the subsector level, and that each subsector may comprehend more than one industry that interact with other industries within the same subsector or classified in a different one. The Bureau of Economic Analysis, which was the source for the data on GDP by subsector, specifies that GDP is calculated as "*the sum of what consumers, businesses, and government spend on final goods and services, plus investment and net foreign trade*" (BEA, 2015). Exports are not limited to final goods.

Thus, given those specifications, and despite the fact that on the surface it seems impossible for exports to be greater than production, it is feasible to understand that in many cases during the study, total exports by industry exceed the output value. Some actors contributing to this phenomenon could be:

- In the case of exports of products containing imported parts, the imported parts will be deducted from GDP calculations but not the export values, thereby inflating the export to GDP ratio.
- If a state manufactures significant value in intermediate products, the value of those products sold in the United States will not count toward GDP even as those exported abroad will.
- Sometimes, for logistic reasons, goods are exported from a different location than the one where they are produced. At times, the origin of the export is recorded as the point of departure rather than the point of production.
- Also for logistic purposes, some import hubs, even if they are not the final destination for the goods, are recorded as the location of import. This lowers reported GDP and, if not offset by local consumption levels, can make the calculated GDP smaller than the export value.

As a consequence, it is important to interpret these numbers carefully and understand that they are intended to compliment the more robust calculations of concentration and dynamism by giving us some indication of the binational orientation of the various subsectors. Moreover, it is necessary to highlight that the calculation was done taking into account the subsectors' contribution to GDP and exports. In the case of GDP, in addition, we included total GDP to calculate the share that each subsector has on total state GDP. Exports numbers are roughly similar to state totals.

Appendix C: Sources

To conduct our analysis, we used two basic data sources. For the *municipios* located along the border in Mexico and national employment, we used the Economic Census from 2009 and 2014 conducted by the Statistics Bureau in Mexico (INEGI). From the Economic Census 2009, the INEGI used as a reference the economic activities undertaken from January 1st to December 31st, 2008, although the Census was conducted in 2009. The classification of the establishments was done using the NAICS Code System, version 2007.

In the case of the Economic Census 2014, the information used by this study was the one collected taking as a reference period January 1st to December 31st, 2013. The version of the NAICS Code System used was from 2013. Two codes contained in the version from 2007 coalesced into one code in the 2013 version (7221 & 7222 merged into 7225)[1].

For both years, the Economic Census only considers permanent or semi-permanent establishments, while itinerant establishments are not considered. This implies that the informal sector is not taken into account in this study. Not included in the Census are activities included in the agricultural sector, private households employees, railroad employees and political organizations.

As for the data from the counties located along the border in the United States and countrywide data, we used the County Business Patterns (CBP) for 2009 and 2013, as it is the most complete data source available to the public. In terms of employment, the variable used was employment reported in mid-March. When data on employment is missing, the CBP includes an imputed value.

The NAICS Code System used for each year is the same that was used in the case of Mexico, although the codes may vary due to the presence of country-level codes. The CBP series excludes data on "*self-employed individuals, employees of private-households, agricultural production, railroad employees and most government employees*" (CBP, 2015).

Data on state GDP was obtained from the Bureau of Economic Analysis, which publishes total employment at the subsector level (3-digit NAICS codes) by state. Similarly, data on trade at the subsector level was obtained by using the USA Trade Online Tool published by the U.S. Census Bureau. This tool allowed us to obtain total exports to Mexico. INEGI was our source for data on trade and GDP by state at the subsector level for the Mexican states included in the study. As no information is published about trade with the United States at the state level, we used as a proxy total exports from Mexico to the United States. Exchange rates and percentages were calculated using averages for the periods analyzed.

1 This change applies for both, Mexico and the United States

Data Sources:

- Censos Económicos 2009, Metodología de los Censos Económicos 2009, INEGI http://www3.inegi.org.mx/sistemas/biblioteca/ficha.aspx?upc=702825001965
- Censos Económicos 2014, Metodología de los Censos Económicos 2014, INEGI http://www3.inegi.org.mx/sistemas/biblioteca/ficha.aspx?upc=702825068202
- County Business Patterns, How the Data are Collected (Coverage and Methodology), United States Census Bureau http://www.census.gov/econ/cbp/methodology.htm
- Bureau of Economic Analysis http://www.bea.gov/
- USA Trade Online, United States Census Bureau https://usatrade.census.gov/
- INEGI http://www.inegi.org.mx/

Other Sources:

- Billings, Stephen and Johnson, Erik (2012), "The location Quotient as an estimator of Industrial Concentration", *Regional Science and Urban Economics*, Vol 42, pp. 642-647
- CaliBaja Research Initiative, "Jobs Without Borders: Employment, Industry Concentrations, and Comparative Advantage in the CaliBaja Region," CaliBaja, Center for US-Mexican Studies at UC San Diego, El Colegio de la Frontera Norte, 2014, https://usmex.ucsd.edu/_files/2014_report_jobswithoutborders.pdf.
- Combes, Pierre-Phillippe et al. (2008), *"Economic Geography: the integration of regions and nations"*, Princeton: Princeton University Press
- Delgado, Mercedes et al. (2014), *"Defining Clusters of Related Industries"*, National Bureau of Economic Research, Working Paper 20375.
- Delgado, Mercedes, Michael E. Porter, and Scott Stern (2010), "Clusters and Entrepreneurship," *Journal of Economic Geography*, 10, no. 4: 495-518. (U.S. Census Bureau Center for Economic Studies Paper, No. CES-WP-10-31.)
- Ketels, C.H.M. and Memedovic, O (2008), "From clusters to cluster-based economic development," *Int. J. Technological Learning, Innovation and Development*, Vol. 1, No. 3, pp. 375-392.
- Marshall, Alfred (1920), *"Principles of Economics"*, London: MacMillan.
- Porter, Michael (2003), *"The Economic Performance of Regions"*, Regional Studies, Vol. 37.6&7, pp. 549-578.
- Tian, Zheng (2013), *"Measuring Agglomeration Using the Standard Location Quotient with a Bootstrap Method"*, Journal of Regional Analysis and Policy, Vol. 43(2), pp. 186-197.

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