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Is There Life After Ford?

— Structural
Transformation and
Inclusive Growth in
Hermosillo, Sonora*

Even within the low-growth context that prevailed in Mexico between 2005 and 2015, gross domestic product (GDP) per capita in Hermosillo (1.3%) fell below the federal average (1.4%). Two distinctive periods in terms of growth performance are salient within that decade. Between 2005 and 2010 the economy grew at a rate of 1.3%, occupying the 66th percentile (among the top 34%) of all municipalities in Mexico. During the second half of the decade, growth remained roughly stable (1.2%) within a more dynamic country context, resulting in Hermosillo falling to the 47th percentile (53% of Mexican municipalities grew more). The situation worsened between 2013 and 2015, when output per worker fell by 7.2%.

What happened to Hermosillo? Can the existing economic structure sustain the municipality's high wages and guarantee future growth? What policy interventions are needed?

Seeking answers to these questions, the Center for International Development (CID) at Harvard joined efforts with the Emerging and Sustainable Cities Program (ESC) of the Inter-American Development Bank (IDB). In Hermosillo, we deployed two methodologies developed at CID as a framework to think about structural transformation leading to sustained and inclusive growth. The first methodology, the Growth Diagnostic, is an exhaustive series of tests aimed at identifying the most binding constraints to private investment and growth. The second, the Economic Complexity Analysis, detects productive capabilities embedded in the economic activities of a location and provides a sector roadmap for productive diversification that can be potentially conquered by redeploying existing know-how. The underlying notion is that opportunities in more complex sectors that can in turn sustain higher wages have a higher probability of success if they rely on a set of productive capabilities and know-how that are similar to those already in place.

These methodologies complement each other. They allow us to assess the extent to which private investment in the sectors and products with the greatest potential—as identified by the Economic Complexity Analysis—may have been inhibited by binding constraints such as a missing productive capability or in-



CREDITS: Inter-American Development Bank (2016-2018).

adequate supply of key public goods—as detected in the Growth Diagnosis. Making this connection explicit is precisely one of the most innovative components of our work in Hermosillo.

An additional innovative component of this work is that Hermosillo is the smallest sub-national unit where we have deployed our methodologies. Recently, CID was involved in similar projects in Mexico in which we had to adapt our working frameworks to make them relevant at the state level (Chiapas, Baja California, Tabasco, and Campeche). Hermosillo represents the first time that CID deployed its methodologies at the city level, forcing the team to forego some of the most common potential constraints that are invariant at the national or state level, and develop new ways to exploit variations at the municipality level. This essay summarizes our research efforts, presents preliminary insights into the fascinating question of what makes cities wealthier, and articulates those answers as policy recommendations.

— Hermosillo's Economic Structure: Engine Stagnation

When automobile production began in Hermosillo in 1986, it was not a common economic activity. Back then, only 13% of all countries showed a comparative advantage in automobile exports. Since then, the knowledge required to manufacture cars has become gradually more ubiquitous. By 2010, 50% of countries in the world exported auto motor vehicles competitively. And yet, car manufacturing still represented 64% of Hermosillo's output by 2013 and 51% of its exports by 2014. Over the last five years (2012-2017), the manufacturing sector, the vast majority of it concentrated in the automobile sector, has undergone a cumulative decline in both number of jobs (-7.3%) and median real wages (-5.9%). The parallel decline in wages and employment is indicative of a decrease in demand for the city's current manufacturing output (Figure 1). Paradoxically, the continued reliance on a sector that catalyzed accelerated industrialization 30 years ago is now a factor behind growth slowdown.

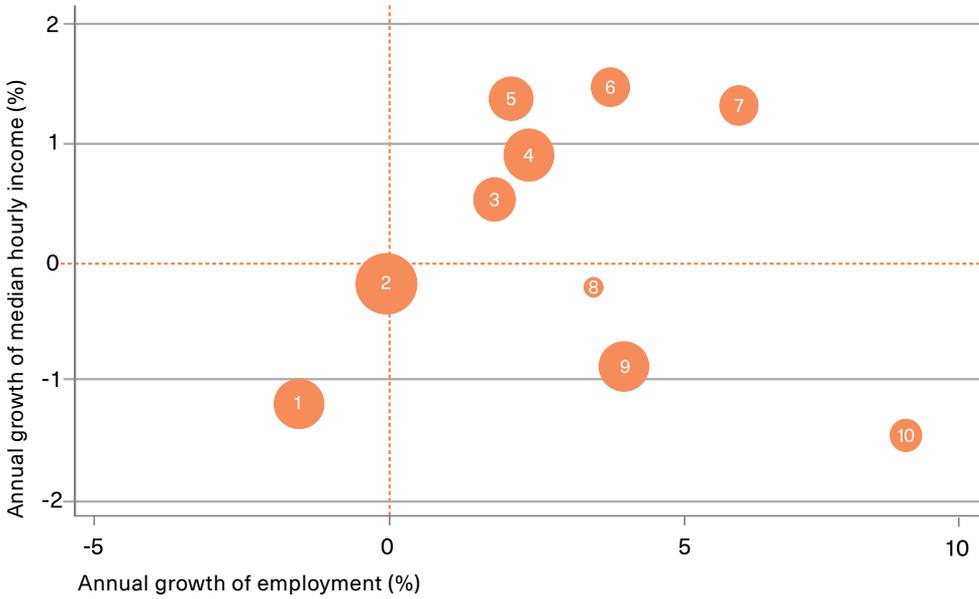
In order to test if these findings were unique to Hermosillo or part of a broader trend, we composed a peer-group of 10 comparable Mexican cities. These cities were selected using a hierarchical cluster methodology that considered the size of the city's workforce, the total value of its exports, its economic complexity, and the composition of its exports. When considering the performance of these peer-group cities, we do not observe a similar trend. Whereas the manufacturing sector in Hermosillo experienced a cumulative drop in employment (-7.3%) and median real wages (-5.9%), comparable cities displayed an average increase of 37.7% in the number manufacturing jobs and of 6.7% in the median real wages in the sector. The differences between Hermosillo and its peer-group also extend to their ability to reshape their economic structure. Consider for example Aguascalientes, a city that also displays a significant reliance on automobile production (57% of gross domestic product and 49% of exports). In 2004, the export basket of Aguascalientes had an average Economic Complexity (0.86) very similar to that of Hermosillo (0.79), and both were at the bottom rank of our peer-group of comparable cities (Figure 3).

Since then, Hermosillo and Aguascalientes have followed remarkably divergent trajectories.

The economy of the capital of the Sonora State has clearly lost its dynamism over the past few years.

In the 10 years spanning 2004 to 2014, while the composition of Hermosillo's export basket persisted, Aguascalientes leveraged its knowledge base and moved on to conquer more complex products. While in Hermosillo, 60% of its products with a comparative advantage in 2014 already existed before 2004 (33 out of 54 products), in Aguascalientes that figure did not reach 30%.

It is worth noting that in 10 years, the overall number of products exported in Aguascalientes did not increase, but the composition of the basket did move towards more complex goods. The share of highly-complex products (such as machinery) went from 23.4% to 37.8% of the export basket, while that of less complex ones (such as textiles and furniture) went from making up 34.0% to 16.2%. Aguascalientes was able to counteract the gradual loss in the Product Complexity Index (PCI) of its initial export basket by adding more complex products over the course of the decade (Figure 2). Meanwhile, the diversity of exports in Hermosillo not only dropped in absolute terms (going from 68 products in 2004 to 54 products in 2014), but the city was unable to develop new, more complex, products that would help in counterbalancing the inertial loss of PCI of its initial export basket. By 2014, Aguascalientes had triple the Economic Complexity of Hermosillo.



- 1. Manufacturing
- 2. Wholesale & Retail
- 3. Construction
- 4. Diverse Services
- 5. Social Services
- 6. Government
- 7. Hotels & Restaurants
- 8. Mining & Electricity
- 9. Professional & Financial Services
- 10. Transport & Communications

FIGURE 1. Job and wage trends by economic sector (2012-2017) in Hermosillo / The size of the bubble represents the number of workers. CREDITS: Own calculations based on ENOE 2012-2017, INEGI.

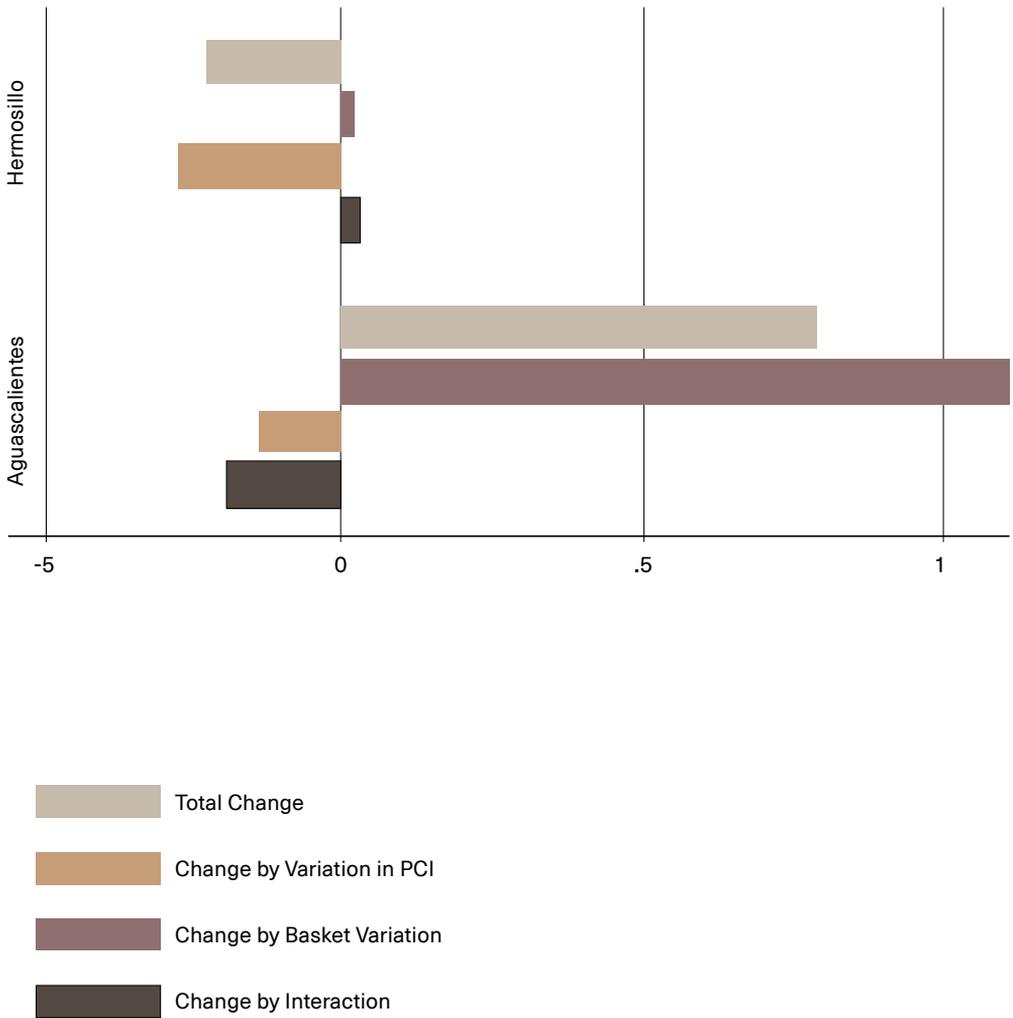


FIGURE 2. Breakdown of change in the Economic Complexity Index by variation in the Product Complexity Index (PCI) of the original export basket, variation in export basket composition and interaction of both changes (2004 and 2014) Hermosillo and Aguascalientes. CREDITS: Own calculations based on the Atlas of Economic Complexity.

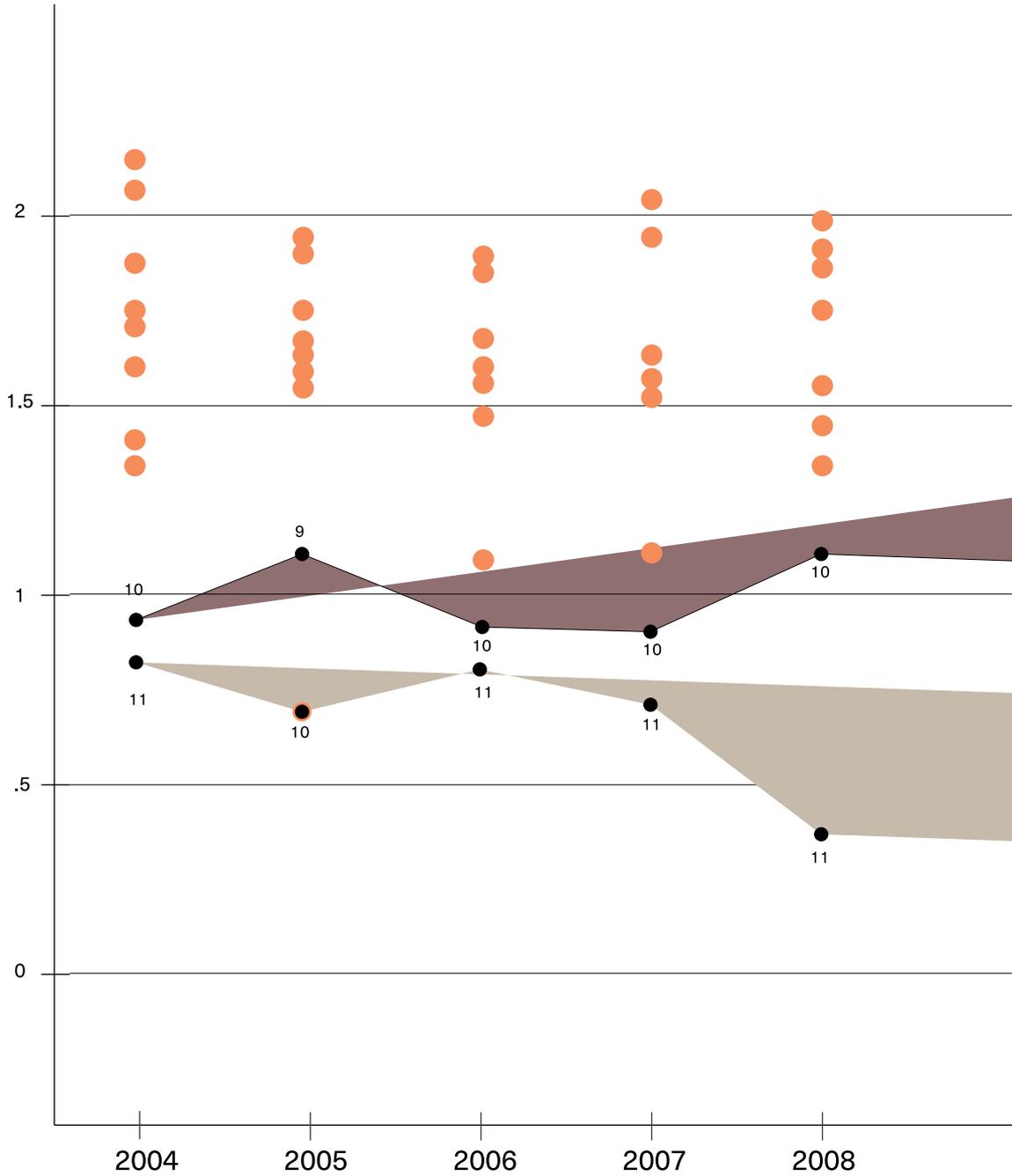
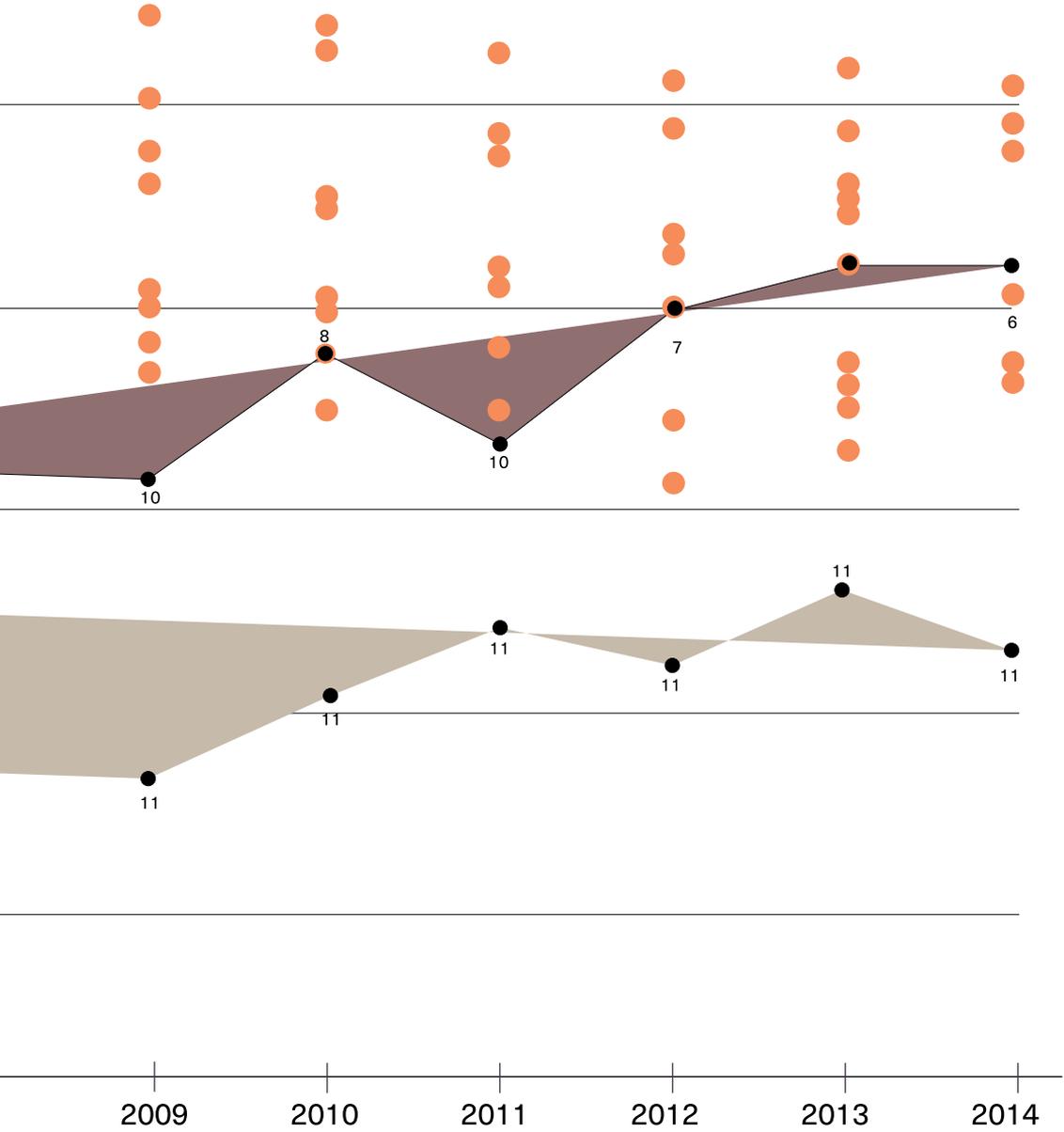
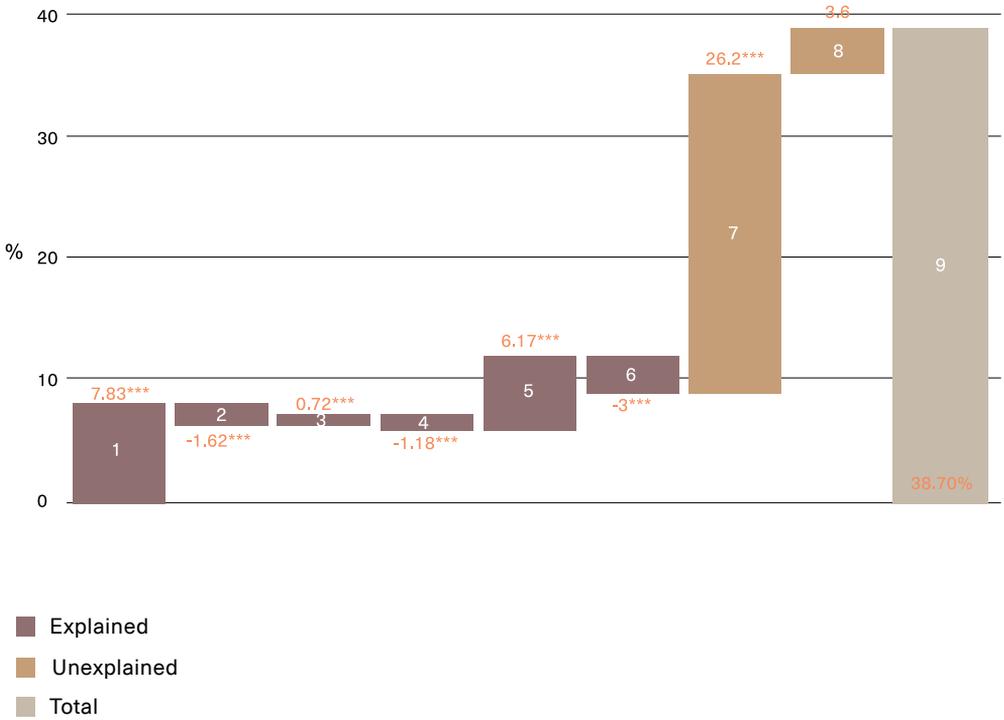


FIGURE 3. Evolution of Economic Complexity Index (2004-2014) Hermosillo, Aguascalientes, and comparison municipalities.
 CREDITS: Own calculations based on the Atlas of Economic Complexity.





- 1. Education
- 2. Male
- 3. Indigenous Language
- 4. Experience
- 5. Occupation
- 6. PCI
- 7. Constant
- 8. Rest Non-Observables
- 9. Gap

FIGURE 4. Blinder-Oaxaca decomposition of employee wage gap in export sector (2015), Hermosillo vs. all other municipalities in Mexico. CREDITS: Own calculations based on the 2015 Intercensal Survey and the Atlas of Economic Complexity.

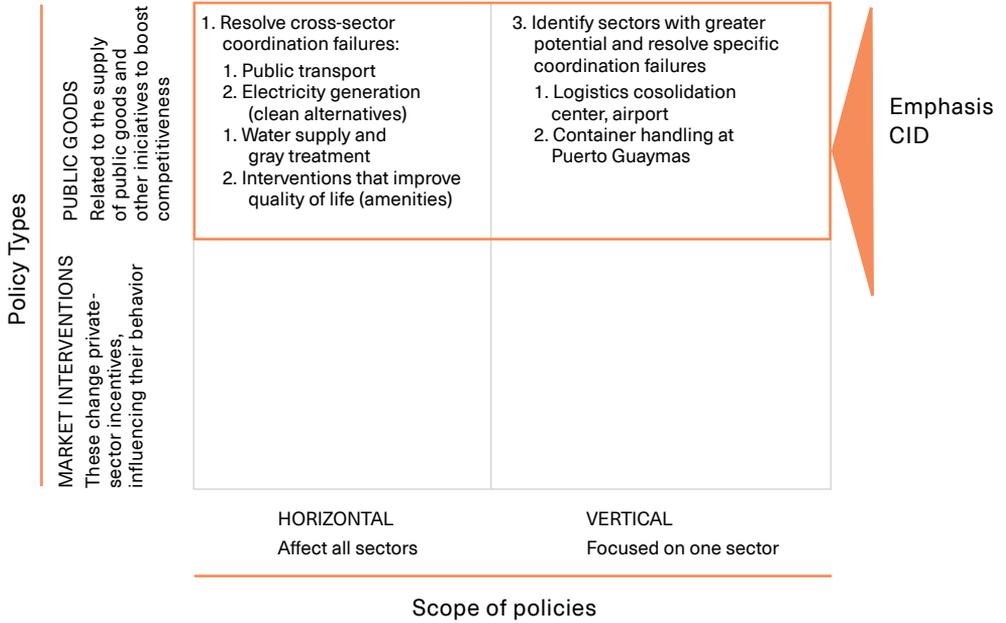
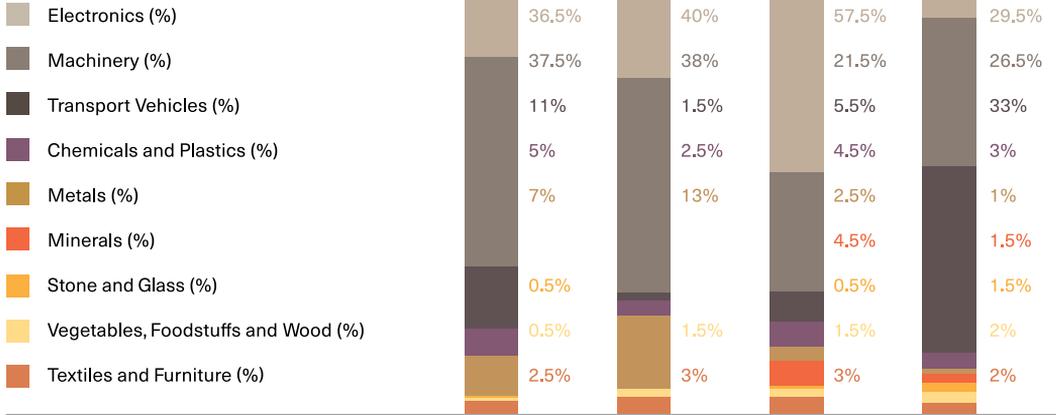
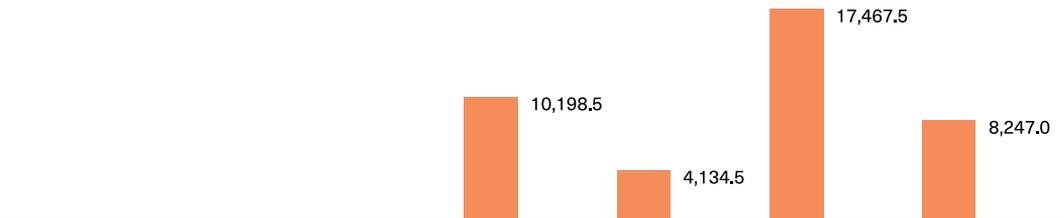


FIGURE 5. Productive development policies (PDP) in Hermosillo. CREDITS: Adapted from Campante and Solé (CID, 2015), based on Crespi, Fernández-Arias, and Stein (2014).

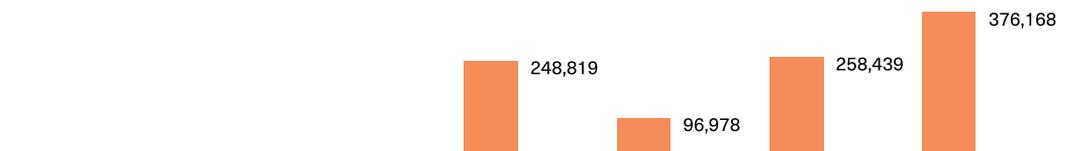
EXPORTS COMPOSITION BY PRODUCT CATEGORY (2010–2014)



ANNUAL EXPORTS (2010–2014, millions USD)



SIZE OF THE LABOR FORCE (2015)



STATE

NUEVO LEÓN

SONORA

TAMAULPAS

CHIHUAHUA

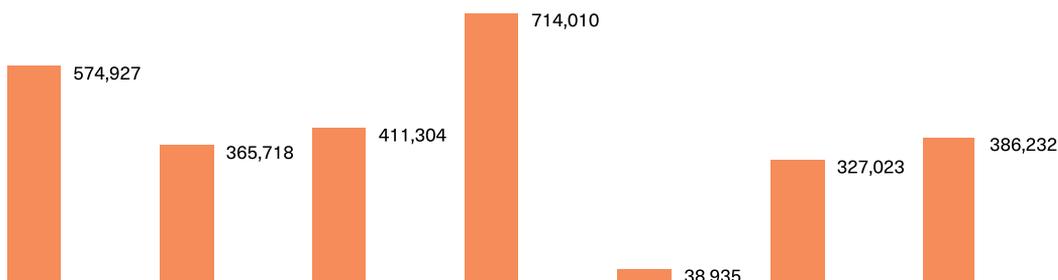
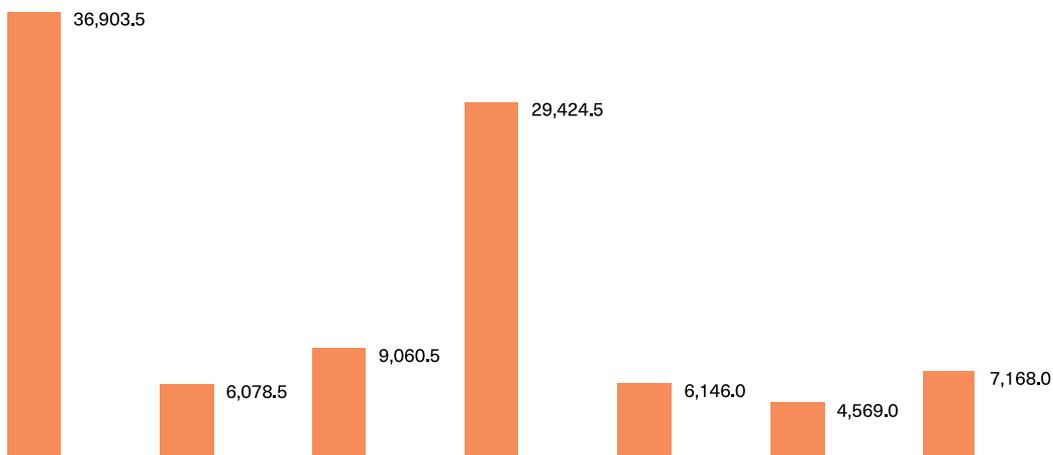
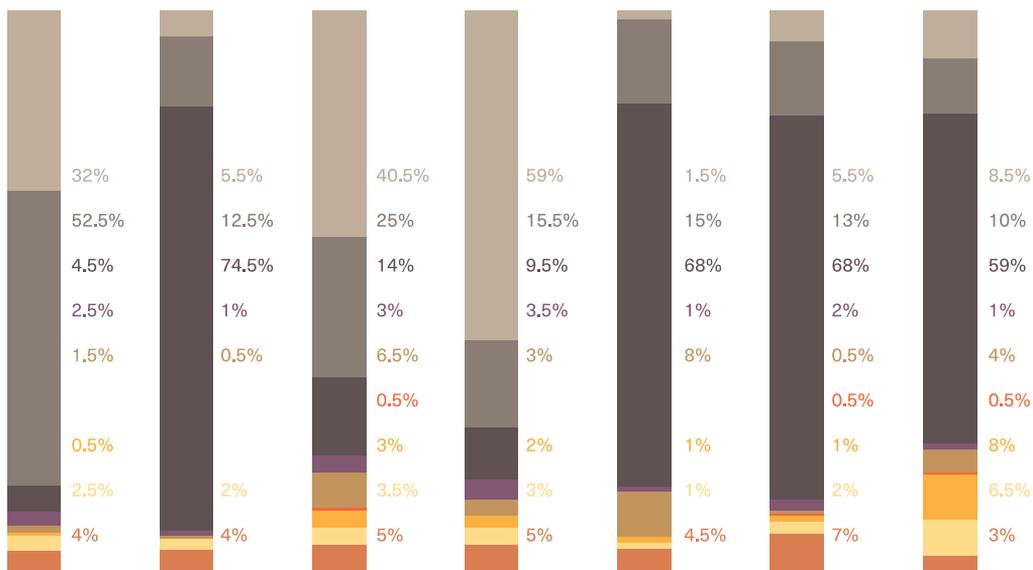
Municipality

Apodaca

Nogales

Reynosa

Chihuahua



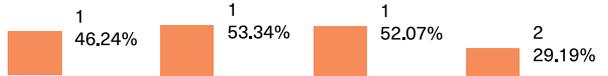
CHIHUAHUA	AGUAS-CALIENTES	BAJA CALIFORNIA	BAJA CALIFORNIA	COAHUILA	COAHUILA	SONORA
Juárez	Aguascalientes	Mexicali	Tijuana	Ramos Arizpe	Saltillo	Hermosillo

MOST PROMINENT PRODUCTS AND INDUSTRIES

EMPLOYMENT (Industry, 2014)

1. Manufacturing

2. Business & Related Services



EXPORTS (Products, 2014)

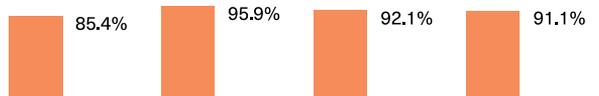
■ Electronics (%)

■ Machinery (%)

■ Transport Vehicles (%)



EXPORTS TO USA (2014)



ECONOMIC COMPLEXITY INDEX (2014)



STATE

NUEVO LEÓN

SONORA

TAMAULPAS

CHIHUAHUA

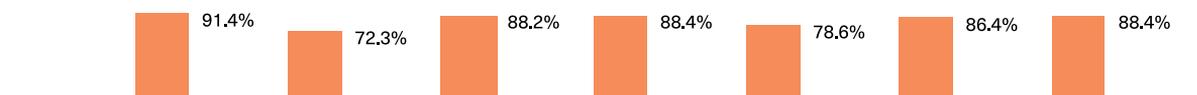
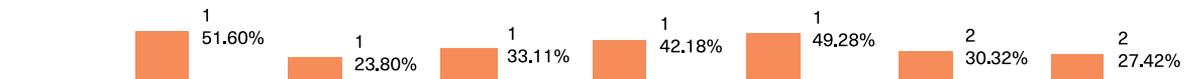
Municipality

Apodaca

Nogales

Reynosa

Chihuahua



CHIHUAHUA	AGUAS-CALIENTES	BAJA CALIFORNIA	BAJA CALIFORNIA	COAHUILA	COAHUILA	SONORA
Juárez	Aguascalientes	Mexicali	Tijuana	Ramos Arizpe	Saltillo	Hermosillo

The constraints preventing Hermosillo from diversifying into more complex products become even more relevant when we consider the situation of its automobile industry. The city's share of total vehicle imports from the United States went from 5.5% in 2006 to 3.7% in 2014. In June 2017, Ford canceled its plans to invest in a new assembly line at its plant in Hermosillo and switched production of the new Focus model to China. There are talks of a potential renegotiation of the North American Free Trade Agreement (NAFTA) that might weaken the relative advantages that have been driving investment into the city's auto plants. All of these factors should trigger a sense of urgency and summon the city's authorities to reconsider how they might imbue the economy with the dynamism it once had before the automobile industry declines at a faster clip.

What can be done to accelerate productive diversification? To answer this question, we must first understand why Hermosillo has not been able to leverage its productive capabilities and know-how since the 1980s to diversify into more complex products.

— Three Hypotheses to Explain Productive Lethargy

Our work in Hermosillo signals three complementary hypotheses. First, there are coordination failures preventing an adequate supply of enabling factors that might accelerate the development of new industries. The city lacks the full array of institutional mechanisms required to identify missing productive capabilities required by potential sectors. Those inputs are typically revealed in the dynamic and iterative process of a productive dialogue that is led, coordinated, and facilitated by local authorities and incorporating representatives from both the private sector and academia. Within the context of this dialogue, parties can also evaluate alternatives to provide missing inputs and explore the different mechanisms available to finance their provision. While this dialogue gets organized in Hermosillo, our Growth Diagnosis offers a starting point by identifying three deficiencies in the provision of public goods that might be impeding the appearance of

new industries: cost-effective electricity supply, adequate long-term water supply, and logistics infrastructure.

Second, relatively high levels of public employment may be causing wage distortions in Hermosillo. Mean wages in the city are 35.7% higher than in the rest of Mexico, and 16.7% higher than the average wage of our comparison group. These differences cannot be explained by any of the factors associated with individual workers (education, experience, gender, indigenous origin), nor by the sophistication or complexity of the productive structure (which is lower in Hermosillo).

One possible hypothesis is that employment in the public sector, where salary grades are primarily determined by level of education and experience rather than productivity, could be pushing equilibrium wages upward. This is based on the fact that the public sector in Hermosillo is the fifth largest employer and the proportion of public employment is 1.8 times greater than the average for the comparison group. Between 2012 and 2017, Hermosillo was the only municipality in the comparison group where both wages and employment in the government sector grew (1.5% and 3.8% as portrayed in Figure 1 above); the trend in the rest of Mexico registered a combination of wage increases and lower number of employees. While it is true that this sector is key to the promotion of well-being and that having well-remunerated public servants improves recruiting and reduces incentives for corruption, these dynamics may be driving higher equilibrium wages, making the required occupational vectors of potential sectors more expensive than in other comparable cities.

The final hypothesis is that Hermosillo lacks innovation catalysts. Cities and regions learn to do new things through various mechanisms. Two of the most important are attracting new firms and individuals that have the necessary know-how, namely, foreign direct investment (FDI) and immigration. Hermosillo does not stand out in either of these. Based on the FDI Markets database, between 2003 and 2016 Hermosillo received approximately \$3.2 billion US dollars in FDI. No less than 91% of that figure was accounted for by a single company: Ford. The large concentration of FDI in one firm is noteworthy, but so too is the fact that most

of the investment was devoted to expand pre-existing activities. Automobile assembly can be a decisive contributor to growth—Hermosillo is a good example—but it has a much lower potential of creating and diffusing know-how than more knowledge-intensive activities, such as design, testing, research, or development. According to this same database, Hermosillo has not received any investment since 2003 in these activities, which represent 3% of investment in the rest of Mexico and 2% in the comparison municipalities. In terms of immigration, the figures are not encouraging either. In 2005, only 0.6% of workers in Hermosillo were foreign immigrants, one third of the average of the comparison group. The internal (within-Mexico) immigration rate is more aligned with comparable cities, but in Hermosillo it is mostly (62%) composed of migrants coming from other municipalities within the Sonora State. Low scores on these two key transmission channels may be preventing the arrival of the new know-how that Hermosillo needs to diversify its productive structure.

Public Policies to Facilitate Productive Diversification

What can be done to reverse this situation? In this section, we include a packet of inputs for designing policies aimed at imbuing more dynamism into the economy of Hermosillo and diversifying its productive structure. We have grouped our policy recommendations in three areas: providing a roadmap of potential sectors, mechanisms to resolve coordination problems, and urban planning.

The complexity profile for Hermosillo has enabled us to identify sectors and products with high potential that require know-how and productive capabilities that are relatively similar to those already in place. Additionally, we have designed a preliminary sorting mechanism that weighs other conditions affecting the profitability of those sectors, including external factors (evolution of product demand on world market, strength of product in Mexico, and labor impacts) and internal factors (dependence on electricity, water, and logistics). The resulting list is essentially comprised of products that are somehow associated with the automobile

ecosystem and the aerospace sector, such as machinery (parts for spark-ignition engines, drive shafts, pumps, compressors, and fans; thermometers and other gauges; liquid pumps), and electronics (for example, automobile lighting and electric ignition devices). Other products with potential in Hermosillo are electrical transformers, electrical control, or distribution panels, chemicals, and plastics (for example, vulcanized rubber tubes and downstream manufacturing). The fact that a large proportion of these products exhibit on average a dependency on electricity, water, and logistic infrastructure that is greater than sectors already in Hermosillo, indicates that a) supply deficiencies will have to be resolved to maximize the likelihood that new sectors appear, and b) those less intensive in the use of these factors may be prioritized. As stressed before, the list of sectors and products should be considered merely as a road map to spark an iterative, dynamic process of public-private dialogue aimed at solving the coordination problems that have inhibited the appearance of these sectors and hampered structural transformation.

Ultimately, Hermosillo's success in attracting investment and increasing the complexity of its economy critically depends on urban planning.

Our second recommendation is thereby to set up an institutional mechanism that would allow the city to gather information on the potential sectors in terms of missing inputs or capabilities, evaluate policies and mechanisms to remove binding constraints, and learn from its own successes and failures. In our experience, the success of institutional productive-dialogue depends on five fundamental functional elements. First, it must have active participa-



CREDITS: Inter-American Development Bank (2016–2018)

tion from the private sector, whose role must go beyond generating requests to ideally taking part in the design, co-financing, and implementation of solutions. Second, the dialogue should collect information and understand the perspective of potential investors; beyond promoting the city, it must be aimed at understanding what productive capabilities are missing by interacting with stakeholders that are not present. Third, the institutional mechanism must be technically well-endowed, able to validate the results of the public-private dialogue in terms of potential sectors and major restrictions, as well as to propose and implement solutions. Fourth, the dialogue should help the city to understand its own productive potential. Finally, it should make use of instruments other than those focused on improving profitability (i.e. tax exemptions) and focus on those that enable higher productivity (i.e. required public goods). While some of these elements affect all sectors alike (horizontal), others focus on solving constraints to the entrance of specific sectors (vertical) (Figure 5).

Ultimately, Hermosillo's success in attracting investment and increasing the complexity of its economy critically depends on urban planning. The decision to settle in an area—either at a corporate or individual level—is made not only taking into account geographic location, market potential, and institutional capability, but also quality of life. The variety of restaurants, cultural spaces, shopping centers, public spaces, parks, historic center, pedestrian zones, availability of high-quality public and private services (education, health, and safety), and ease to get around and connect with work hubs, are thus factors.

The situation of Hermosillo today is much better than the one that prevailed 30 years ago, when Ford first decided to set foot in the city. The city boasts relatively high income levels, as well as low poverty and informality rates, and is one of the areas with the most competitive potential in Mexico. However, it cannot rest on its laurels. Income per capita is higher than what we would expect given its economic structure, a feature that tends to foreshadow lower growth rates. The economic slowdown of the past few years is an alarm bell that should encourage authorities to rethink their growth strategy. The city needs a new approach built on a foundation that takes into account how similar places succeeded in attracting new business models and investment in more complex industries. Doing so will require leveraging the city's know-how to diversify productive structure and instrumenting effective public-private dialogues to overcome the most binding constraints. In a way, the key to a prosperous future in Hermosillo depends in being able to reproduce—within a different context—the feats of its past.

Notes/References

1 – GDP at a municipal level was estimated by assigning the contributions made by each municipality to the state's GDP. To approximate these contributions, we tested the fit of different methods and ended up leveraging a non-parametric approximation that assigned a share of the state's output in a given economic sector to each municipality based on the number of employees working in that sector that were hosted by the municipality. More detail of the methodology used can be found in an upcoming working paper to be featured in the Harvard CID Working Paper Series.

2 – The Economic Complexity Index of a certain product or industry reflects the amount and variety of knowledge required to manufacture it. Hausmann, Hwang, and Rodrik (2007) have documented that richer countries benefit from a large agglomeration of knowledge that allows them to produce more diverse goods, that on average fewer countries are able to make.

3 – Relative comparative advantage is defined in Balassa (1964) as when exports of a certain product represent a larger share of the place's export basket than the same product represents to world trade.

4 – The range of possible cities was also constrained by certain geographical parameters. More detail on the methodology used to select peer groups can be found on an upcoming working paper to be featured in the Harvard CID Working Paper Series.

5 – Featured in the ENOE survey.

6 – For Direct Foreign Investment statistics, we used FDI Markets, which reflects investment announcements taken from the media. This database shows a bias toward large projects with greater visibility, so it is not exhaustive. Also, the database does not follow up to confirm whether these investments were in fact made according to the preliminary announcement.

7 – <http://imco.org.mx/competitividad/indice-de-competitividad-urbana-2016/>

8 – See Hausmann, Hidalgo, et al (2011).



CREDITS: Inter-American Development Bank (2016–2018) (left and right).



A quick glance at the contemporary urban landscape of the city of Hermosillo does not suggest the presence of any urgent problems. On the contrary, the city appears organized, prominent, and growing, with no visible signs of chaos; it presents an infrastructure system that seems to be working fairly well, with new housing developments spreading across the desert, a thriving automobile industry, and new shopping malls and golf courses served by a car-oriented grid that arranges the vapid atmosphere into an illusion of order.

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Searching for a New Urban Paradigm

— Rethinking
Hermosillo