Tourism and Economic Development: Evidence from Mexico's Coastline*

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Abstract

Tourism is one of the most visible and fastest growing facets of globalization in developing countries. Despite widespread policy interest, however, we currently have limited empirical evidence on the economic consequences of this channel of market integration. This paper combines a quantitative spatial equilibrium model of trade in goods and tourism services with a rich collection of Mexican microdata and a new empirical strategy to estimate the long-run economic consequences of tourism. We begin by using the data to estimate a number of reduced form effects of tourism on local economic outcomes in today's cross-section of Mexican municipalities. To base these estimations on plausibly exogenous variation in long-term tourism exposure, we exploit geological and oceanographic variation in beach quality along the Mexican coastline, and use historical high-resolution satellite data to construct instrumental variables. To guide the estimation of tourism's welfare implications, we then write down a spatial equilibrium model, and use the reduced form moments to inform its calibration for counterfactual analysis. We find that tourism causes large and significant increases in long run local real economic activity. Contrary to much of the existing literature on tourism and development, these effects are driven by sizable positive spillovers on traded goods production. In the aggregate, however, we find that these spillovers are largely offset by reductions in agglomeration economies among non-touristic regions, so that the national gains from tourism are mainly driven by a classical market integration effect. Finally, we find that the distribution of these gains significantly differs across groups of gender, education, ethnicity and age, and quantify the interplay of forces that underlie this heterogeneity.

Keywords: Tourism, economic development, spatial equilibrium, gains from trade.
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1 Introduction

Tourism is a peculiar form of market integration. Instead of shipping goods across space, tourism involves the export of non-traded local amenities, such as beaches, mountains or cultural amenities, and local services, such as hotels, restaurants and local transport, by temporarily moving consumers across space. Tourist expenditures on these local services are then reported as tourism exports in cross-country data on services trade flows. Over recent decades these tourism exports have grown to become a quantitatively important channel of global integration, and this is particularly the case for developing countries.[1]

Unsurprisingly in this context, tourism has attracted widespread policy attention in both developed and developing countries. Virtually every country in the world has one or several publicly funded tourism promotion agencies. Some governments and international organizations have also been advocating the promotion of tourism to foster local economic development in economically lagging regions within countries.[2] On the other hand, much of the existing social sciences literature on tourism has been critical about its long run economic consequences, especially in developing countries.[3] For example, Honey (1999) and Dieke (2000) have questioned the extent to which the gains from tourism accrue to the local population, rather than being captured by multinationals or domestic elites. In economics, the existing literature has argued that tourism may give rise to a particular form of the "Dutch disease" by reallocating factors of production towards stagnant services activities and away from traded sectors with higher potential for productivity growth (Copeland, 1991).

Despite the rapid growth of tourism and widespread policy attention, the existing literature on trade and development has so far paid relatively little attention to this channel of market integration. This paper aims to fill this gap. The analysis makes two main contributions. First, we combine a rich collection of Mexican microdata with a new empirical strategy to estimate a number of reduced form effects of tourism on local economic outcomes. To base estimations on plausibly exogenous variation in long term tourism exposure in today's cross-section of Mexican municipalities, we propose an instrumental variable (IV) strategy that exploits historical high-resolution satellite data on geological and oceanographic variation in beach quality along the Mexican coastline. Second, we write down a quantitative spatial equilibrium model of trade in goods and tourism services, and use the estimated reduced form empirical moments to inform its calibration. The model allows us to quantify the welfare implications of tourism in Mexico and the distribution of the gains from tourism across different groups of the Mexican society. It also sheds light on the underlying channels. For instance, the model explicitly allows for potentially adverse

[1] World tourism exports were USD 1.25 trillion in 2014, making it the single largest sector of global trade in services. Tourism exports of low and middle income countries have grown at an average annual rate of 11 percent over the period 1982-2012. For this group of countries, tourism exports have been of the same magnitude as 75 percent of all food and agriculture exports combined, and 60 percent of total FDI inflows over the past decade. Figures are based on UNCTAD statistics (see http://unctad.org/en/pages/Statistics.aspx).

[2] See for example "*Passport to Development*" (WorldBank, 1979) or "*Tourism and Poverty Alleviation: Untapped Potential*" (DFID, 1999).

[3] See Hawkins & Mann (2007) for a review of this literature.

effects of tourism by introducing different sources of local production externalities. By altering the scale of local production, tourism can affect the productivity of traded goods production. These spillover effects operate in addition to the standard general equilibrium effects through wages and prices. Depending on the sign and size of the within and cross-sector spillovers, the aggregate gains from tourism can either be magnified or diminished compared to the conventional gains from market integration in tourism.

At the center of the analysis lies the construction of a rich collection of microdata. We assemble a database containing: i) municipality-level hotel revenues, employment, population and wages by gender, education, age and ethnicity, and output by sector from the Mexican Censos Economicos in 1998 and 2008 and the Mexican population censuses in 2000 and 2010; ii) a long time series of census data for consistent spatial units covering the period 1921-2010; iii) remote sensing satellite data at a resolution of 30x30 meter pixels covering roughly 9,500 km of Mexican coastline across six different bands of wavelength during the 1980s and 90s; iv) a vector of local (dis-)amenities including restaurant and store density, road accidents, environmental pollution and crime collected from several administrative sources; v) municipality-level public finance data covering the period 1989-2010; and vi) panel data on bilateral tourism exports and relative prices covering 115 countries over the period 1990-2011.

Armed with this database, the analysis proceeds in four main steps. In step 1, we estimate a number of motivating reduced from effects of tourism on municipality-level population, employment, and wages by groups of gender, education and ethnicity, and local GDP by sector of activity. We take inspiration from the tourism management literature that has argued that tourism activity can to a large extent be determined by the quality of a very specific set of local natural characteristics (e.g. Weaver et al. (2000)). We identify a set of beach quality criteria from that literature (Leatherman, 1997), such as the presence of a nearby offshore island or the fraction of onshore coastline covered by white sand beaches, and use our satellite data to construct a number of instrumental variables capturing tourism attractiveness along the Mexican coastline.

The identifying assumption is that islands or the fraction of coastline covered by picture-perfect sand beaches do not affect local economic outcomes in today's cross-section of Mexican municipalities relative to other coastal municipalities except through their effect on tourism activity. We assess the validity of this assumption in several ways. We report how OLS and IV point estimates are affected by the inclusion of observable pre-determined municipality controls, and assess whether six different instrumental variables yield similar point estimates. To further assess the extent to which the IVs may impact the local economy by directly affecting the amenities of local residents or being correlated with natural advantages in other sectors, we also construct a long time series of population census data for consistent spatial units in Mexico, and estimate the effect of the IVs on municipality populations in periods before beach tourism became a major force in Mexico (censuses of 1921, 1930, 1940 and 1950) as a placebo falsification test. Finally, we also verify the extent to which our IVs are correlated with model-based estimates of local amenities in today's cross-section of municipalities.

Using this empirical strategy, we find that variation in local tourism activity has strong and significant long-term positive effects on municipality total employment, population, local GDP and wages. According to our preferred specification, a one standard deviation increase in local tourism expenditure in today's cross-section of Mexican municipalities leads to a doubling of municipality total employment, and increases nominal municipality GDP by a factor of 2.5. These effects appear to be driven by sizable multiplier effects on other local sectors of activity. For example, a one standard deviation increase in local tourism expenditure more than doubles local manufacturing GDP. Importantly, these effects do not appear to be sensitive to excluding tourism centers that were planned and subsidized by the government or to taking into account differences in public investments across touristic and non-touristic places. The data also allow us to break up the effects on employment, population and wages by different groups of the Mexican society. We find that the employment gains are biggest in proportional terms for skilled relative to unskilled labor, for women relative to men, and for indigenous workers relative to Hispanic workers.

In step 2, we interpret these results through the lens of a quantitative multi-country multi-region spatial equilibrium model. To this end, we extend the theoretical framework of Redding (2015). The model features trade in tourism services in addition to trade in goods. Falling cross-border or within-country frictions to tourism give rise to gains from a classic market integration effect, and these gains may be unequally distributed across different groups of the population. On top of that effect, we allow tourism to affect welfare through local production externalities. In the model, tourism affects the economic activity of traded sectors (manufacturing) through two channels. First, it affects other sectors through its general effect on wages and prices. For example, a positive shock on tourism pushes local wages up, which may decrease local manufacturing activity. Second, it affects the local scale of economic activity in services production and traded goods production which may impact manufacturing productivity through local within and cross-sector productivity spillovers.

In step 3, we use the data to estimate the key parameters of the model, and calibrate it to current-day Mexico as a reference equilibrium. We first estimate the elasticity of substitution between different touristic destinations (the trade elasticity for trade in tourism services). To do so, we use bilateral country-level panel data on tourism exports, and use nominal exchange rate changes to instrument for relative local consumption prices across different destinations. We then estimate the spatial labor supply elasticity. To do so, we exploit the identifying assumption that our IVs affect local employment and population only through their effect on local real wages. Finally, to inform the calibration of the sign and size of tourism's spillover effects, we use the structure of the model to compute a counterfactual equilibrium with prohibitive frictions to tourism. We then calibrate the spillovers such that the outcomes of the counterfactual equilibrium can replicate the placebo regressions ran in the empirical exercise on historical data.

In step 4, armed with these parameters and a number of observed moments in our data, we proceed to explore model-based counterfactuals. We solve for the welfare implications of moving from the current levels of domestic and international tourism to a prohibitive level of tourism frictions. This allows us to quantify the aggregate welfare gains from tourism, decompose these gains into different channels, and analyze the extent to which the gains from tourism are unequally shared across different groups of the population.

We find that tourism causes significant gains to the average Mexican household that are in the order of 2.9 percent of household incomes nationally. These gains are driven by an interesting interplay of channels. Contrary to much of the existing literature on tourism and economic development, we find that tourism leads to sizable positive spillovers on local traded goods production that operate in addition to a classical market integration effect. We estimate that this spillover effect is due to both a significant cross-sector externality between services production and manufacturing as well as within-sector localization economies in manufacturing. While these two sources of agglomeration economies reinforce one another leading to large observed reallocations of manufacturing production and total GDP towards tourism centers, we find that they largely offset one another for the aggregate national implications of tourism. That is, while tourism leads to large local gains in agglomeration economies for traded goods production, these gains are largely offset by reductions in agglomeration economies among non-touristic regions, so that the aggregate gains from tourism are mainly driven by a classical market integration effect.

Finally, we use the data and our model to explore the heterogeneity of the gains from tourism across different groups of the Mexican society. We find that while the gains are on average positive and significant for all groups, they are also significantly regressive when taking into account the pre-existing distribution of nominal incomes across these groups. Analyzing the underlying channels, we find that the majority of the estimated heterogeneity is due to differences in tourism's factor intensities across different types of labor, which operate in addition to differences in spatial mobility and in evaluations of tourism's effect on local amenities.

This paper contributes to the recent literature on trade and development (e.g. Topalova (2010), Donaldson (in press), Atkin et al. (2015)). Relative to the existing literature, this paper sets focus on tourism, an important and fast-growing but somewhat overlooked facet of globalization in developing countries. There is a small existing empirical literature that has analyzed cross-country data to shed light on the determinants and consequences of tourism.[4] In contrast, this paper uses within-country data in combination with a spatial equilibrium model and a novel empirical strategy to estimate the long run effects of tourism on both regional and national economic outcomes. The paper also relates to the literature that studies possible "Dutch disease" effects associated with natural resource booms by comparing regional outcomes within countries (e.g. Caselli & Michaels (2009), Allcott & Keniston (2014)). Both the methodology we propose and the focus on tourism as a special kind of natural resource boom differ from the existing literature, but the economic questions are closely related.

Methodologically, the paper follows a recent but growing literature that develops quantitative spatial equilibrium models to analyze the welfare consequences of aggregate shocks, taking into account the frictions to trade and mobility between regions within countries (e.g. Redding (2015),

[4] Eilat & Einav (2004) use panel data on bilateral tourism flows over time to estimate the effect of factors such as political risk or exchange rates on bilateral tourism demand. Sequeira & Macas Nunes (2008) use country-level panel data to estimate the effect of tourism specialization on country growth. Arezki et al. (2009) regress average country-level growth rates over the period 1980-2002 on a measure of tourism specialization in a cross-section of 127 countries, and use the list of UN World Heritage sites as an instrumental variable for tourism specialization.

Galle et al. (2014), Monte et al. (2015), Caliendo et al. (2015)). This paper extends these frameworks to study trade in tourism services, and combines the quantitative model with credibly identified empirical evidence to inform its calibration and for model validation.

The remainder of the paper proceeds as follows. Section 2 describes the background of tourism in Mexico and the data. Section 3 presents a number of reduced form estimates of the effects of tourism on local economic outcomes. Section 4 presents the theoretical framework that guides the welfare estimation. Section 5 presents the estimation of the model's parameters and the calibration. Section 6 presents the quantification of the gains from tourism, the underlying channels, and their distribution across different groups of society. Section 7 concludes.

2 Background and Data

2.1 Tourism in Mexico

According to Mexico's national accounts statistics, tourism activity in Mexico has grown over time to account for about 10 percent of total GDP during the past decade. As depicted in Table 1, the bulk of this tourism activity is driven by beach tourism that is located among the 150 coastal municipalities, which account for two thirds of total hotel revenues in Mexico.

Beach tourism started to emerge in Mexico during the 1950s and 60s, about three decades after a devastating civil war had ended in the 1920s. Online Appendix Figure A.1 depicts data on the arrival of international tourists that are available starting in the year 1962. By that time the first generation of Mexican tourist destinations, such as the colonial port city of Acapulco on the Pacific coast or the border city of Tijuana, had emerged and started becoming popular in Hollywood and among the international jet set. The next generation of Mexican destinations for beach tourism appeared during the 1970s and 80s that witnessed the emergence of the Yucatan peninsula (e.g. Cancun) and other popular contemporary destinations such as Los Cabos, Ixtapa or Huatulco.

As is the case for vast majority of countries in the world, the bulk of total tourism activity in Mexico is driven by domestic travel rather than international tourism, with a share of roughly 85 to 15 percent over recent decades according Mexican national accounts statistics. In 2014, Mexico received 29 million international tourists, of which Americans account for the largest share (57%), followed by Canadians (14%) and Britons (3%). [5]

Total tourist revenue in Mexico can be divided into different types of expenditure. According to the national tourism satellite account (Mexican national accounts statistics), 13 percent are spent on accommodation (hotels and other temporary accommodation), 12 percent are spent on restaurants, 17 percent are spent on transportation, 13 percent are spent on artisanals and other goods, and the remaining 45 percent are spent on other services such as entertainment, rentals, or tour operators.

[5] The source for these figures is the Mexican Secretariat for Tourism (SECTUR).

2.2 Data

This subsection provides an overview of the main datasets used in the analysis. Table 2 provides descriptive statistics and Figure 1 depicts the satellite and GIS data.

Censos Economicos for 1998 and 2008

Every five years the Mexican statistical institute INEGI undertakes a census of all economic establishments located in municipalities with more than 2500 inhabitants, and covers a representative sample of establishments in rural locations with less than 2500 inhabitants. The survey questionnaires of these so called Censos Economicos differ by sector of activity (e.g. agriculture, retail, manufacturing, etc). In our analysis, we use the data of the Censos Economicos 1999 and 2009, which contain information about economic activity in 1998 and 2008 respectively. The timing of these two economic census rounds closely coincide with the two most recent national population censuses in Mexico in 2000 and 2010 that we describe below.

Our main explanatory variable of interest is municipality-level sales of hotels and other temporary accommodation. In our specifications, we label this variable hotel sales. Hotels and other temporary accommodation are covered as part of the Censos Economicos Comerciales y de Servicios, from which we obtain two cross-sections of municipality hotel revenues for 1998 and 2008. We combine this information on hotel sales with data from the Censos Economicos in the same years on total municipality GDP, total municipality wage bill, and GDP broken up into manufacturing, services and agriculture.

Throughout the analysis, we will interpret log changes in hotel sales across municipalities as effectively capturing proportional changes in total local tourism expenditures. The practical reason is that the available data for other tourist expenditures, such as restaurants, do not distinguish between sales to local residents as opposed to visiting non-residents. The underlying assumption is that hotel sales are a constant share of total tourist expenditure. Using data from Mexico's tourism satellite account, Online Appendix Table A.1 documents that this assumption appears to be supported by the available data: Accommodation expenditures accounted for on average roughly 13 percent of total tourist expenditure over the period 2003-2013, with very little variation across years.

Population Census Data

We use IPUMS microdata from the Mexican Population Census in 2000 and 2010 to construct municipality-level total population, employment and wages, as well as broken up into groups of gender, education and ethnicity. The IPUMS microdata provide us with 10 percent random census samples in addition to population weights that are linked to each observation. We distinguish between eight groups that are the result of crossing three binary categories of gender (male/female), education (skilled/unskilled) and ethnicity (Hispanic/indigenous). We define workers to be skilled if they have completed secondary education or more (roughly 50 percent of the workforce). And we define workers as indigenous if they report speaking an indigenous language (roughly 15 percent of the workforce), and as Hispanic otherwise.

To construct municipality population and population by different groups, we sum up the number of people surveyed and weight the summation by population weights. To construct total municipality-level employment and employment by group, we make use of the fact that the Mexican population censuses in 2000 and 2010 asked people in which municipality they work, and sum up the number of people (again weighted by population weights) that work in a given municipality. To verify that the 10 percent random samples from IPUMS do not give rise to concerns about sparseness given our focus on the municipality-level, we also report a robustness check using municipality-level population data that is computed from 100 percent samples at INEGI.[6]

In order to construct wages, we first divide monthly incomes by four times the reported weekly hours worked in the census data. We then construct Mincerized wage residuals from a regression of log wages on dummies for gender and ethnicity in addition to the cubic polynomials of years of education and years of age as well as year fixed effects. We weight these regressions by population weights. The final step is to take the population weighted average of the log wage residuals by year and municipality in the data.

In addition to data for two most recent census rounds, we also use Mexican population census data for the years 1921, 1930, 1940 and 1950 in order to estimate a set of placebo falsification tests. To do so, we use INEGI's database called Archivo Historico de Localidades to construct consistent municipality-level spatial units for the year 2010 that we can trace back to 1921. From this database, we extract the history of each census tract that ever existed in each of the 10 national population censuses conducted between 1921-2010. For example if municipality boundaries changed over time, or a census tract was split or merged, these instances are reported and traceable.

GIS and Satellite Data

The earliest high quality and high resolution satellite data that we could find is from the so called Global Land Survey (GLS) 1990 dataset that uses the raw data from the LandSat 4-5 Thematic Mapper (TM).[7] The GLS dataset provides a consoldiation of the best quality raw LandSat imagery that were taken during the period of 1987-1997 over the coast of Mexico. We obtained these data at the original resolution of 30x30 meter pixels for six different bands of wavelength: Band 1 covers 0.45-0.52, Band 2 covers 0.52-0.60, Band 3 covers 0.63-0.69, Band 4 covers 0.76-0.90, Band 5 covers 1.55-1.75, and Band 6 covers 2.08-2.35.[8]

When restricted to a 2 km buffer around the Mexican shoreline, these satellite data provide us with six raster data layers that each have approximately 52 million 30x30 m pixels. Each pixel reports the wavelength value of the given bandwidth that the data layer corresponds to. Figure 1 provides an illustration of the raw satellite data when illustrated with all six bands for all the GLS

[6]Note that while we could find data on total municipality populations from the 100 percent samples, we do not have access to the microdata, which we would need to compute employment versus population, wages, or to break up these variables for different groups.

[7]We are interested in historical satellite coverage to limit the potential concern that more touristic places invest more to maintain high quality beaches (e.g. efforts against coastal erosion). As we discuss in the empirical section, we present a number of robustness checks against such concerns.

[8]We do not make use of a seventh band covering thermal infrared (10.40-12.50) which was only recorded for 120 m pixels.

data tiles that intersect with the Mexican coastline.

We combine these satellite data with a number of basic GIS data layers that we obtain from the Mexican statistical institute INEGI. These data layers include the administrative shapefile for municipality boundaries for the 2010 population census, the position of the Mexican coastline, and the coordinates for each island feature within the Mexican maritime territory. The second panel in Figure 1 depicts the position of islands within 10 km of the Mexican coast.

Data on Local Amenities

To empirically assess our model's assumption that tourism significantly affects local amenities only through its effect on local population (which may affect amenities either positively or negatively), we use a number of administrative Mexican data sources to construct different measures of local (dis-)amenities. The first such measure are traffic accidents per capita at the municipality level. We obtain this measure from the Mexican Transport Authority. The second set of measures are aimed at capturing the degree of environmental degradation or pollution. Using data from Mexico's environmental agency, we compute municipality-level air pollution, the fraction of unbuilt land and the amount of waste per capita. We also obtain information on local crime rates from the Mexican statistical institute INEGI. Finally, we compile data aimed at capturing positive amenities, such as the availability of restaurants, supermarkets or cinemas, which we compute using data from Mexico's national establishment registry called DENUE.

Data on Bilateral Tourism Exports 1990-2011

To estimate the tourism elasticity –the equivalent to the trade elasticity for travel-related trade in tourism services–, we use the newly available data on bilateral tourism exports from the World Bank WITS database on trade in services.[9] We link these data to information from the IMF on bilateral PPP rates for final consumption goods across countries in order to empirically capture the relative price of local consumption from an origin country in a given destination country over time. The database that we construct spans the years 1990-2011 and includes 115 origin and destination countries.

Data on Municipality Public Finances 1989-2010

To assess the role of government investments into more relative to less touristic municipalities, we compile annual data on net public investments (all types of investments and transfers net of local tax receipts) between 1989 and 2010. These data are from INEGI's municipality-level public finance database, which is part of their Sistema Municipal de Bases de Datos (SIMBAD).

3 Reduced Form Effects

This section uses the data described above in combination with the empirical strategy outlined below to empirically estimate a number of reduced form effects of tourism on municipality-level employment, population and wages by groups of the Mexican society, and local GDP by sector of activity in today's cross-section of Mexican municipalities. As well as being of interest in their

[9] The bilateral tourism export data have become available in 2014.

own right, we use these empirical estimates inform the model calibration in Section 5 and thus enter the quantification of tourism's welfare implications in Section 6.

3.1 Empirical Strategy

To estimate the effect of differences in local tourism revenues on municipality-level economic outcomes, we estimate the following baseline specification:

$$ln\left(y_{mct}\right) = \beta ln\left(HotelSales_{mct}\right) + \gamma X_{mct} + \delta_{ct} + \epsilon_{mct} \quad (1)$$

where m indexes municipalities, c indexes coastal versus non-coastal municipalities and t indexes census years. In our baseline specification, we regress two cross-sections of municipality-level outcomes, y_{mct}, in 2000 and 2010 for outcomes computed using the population censuses, and in 1998 and 2008 for outcomes computed using the Censos Economicos, on log local sales of temporary accommodation (hotels and other) in 1998 and 2008, a vector of municipality controls, X_{mct}, and coast-by-period fixed effects.[10] To address concerns about autocorrelated error terms for the same municipality over time, we cluster standard errors at the municipality level.[11]

As noted in the previous section, we address the unavailability of municipality-level data on total local tourism expenditure by making the assumption that variation in log sales of temporary accommodation effectively captures proportional changes in total tourism expenditure across municipalities. As documented in Online Appendix Table A.1, the assumption of a constant share of accommodation in total tourist expenditure seems to be supported in the available data.

The main concern for causal identification in (1) is that municipalities with higher hotel sales are also subject to other local conditions that affect both tourism activity as well as economic outcomes. For example, economically vibrant municipalities could report higher tourism sales because of business travel. Similarly, hotels could locate in municipalities with better transport links or skilled labor with foreign language skills. Conversely, tourism could locate in remote locations with cheaper land prices where hotel resorts can find large stretches of available space with little opportunity cost for land use. A third possibility is that given the bulk of Mexican tourism appears to be beach-oriented (see Table 2), tourist resorts could instead follow natural amenities that are largely irrelevant for other economic outcomes.

To address such concerns and investigate which of these empirical scenarios is likely the case in our empirical setting, we propose the following empirical strategy that proceeds in several steps. In the first step, we report how OLS estimates of β are affected before and after including an additional set of municipality controls. In the baseline specification, X_{mct} includes the log distance to Mexico City, the log distance to the closest stretch of the US border and the log municipality area. These basic geographical controls are aimed to address concerns that larger municipalities

[10]We use the inverse hyperbolic sine (IHS) transformation, where $ln\left(\widetilde{HotelSales}_{mct}\right) = ln\left(HotelSales_{mct} + \left(HotelSales_{mct}^2 + 1\right)^{1/2}\right)$, in order not to throw away variation from municipalities in places with zero hotel sales. Since our identifying variation will come from coastal municipalities that have almost no reported zeroes for hotel sales, this transformation turns out to have little effect on the estimates. As discussed below, we also report results without this transformation, or after assigning zero values the log of 1.

[11]Clustering instead at the state-level or the state-by-year level reduces the estimated standard errors.

that are located close to the main domestic or foreign economic centers have both higher tourism sales as well as more economic activity on the left hand side of specification 1. We then report how the estimate of β is affected after additionally including dummies for state capitals, historical cities (following INEGI's definition of cities with a population above 20k in 1930), colonial ports, as well as the logarithm of the average annual temperature and the average annual precipitation. Reporting point estimates before and after adding these controls helps us document to what extent variation in local tourism activity within a given coast-by-year bin may be correlated with a number of observable and pre-determined confounding factors that also matter for local economic outcomes.

In the second step, we then construct a number of instrumental variables for $ln\left(HotelSales_{mct}\right)$. We take inspiration from a long line of literature in tourism management (e.g. Weaver et al. (2000)) arguing that tourism activity is to a large extent determined by the quality of a set of very particular local natural amenities. We identify two criteria for touristic beach quality from that literature Leatherman (1997) that we can empirically capture along the roughly 9500 km of Mexican coastline using our satellite data: i) the presence of a nearby offshore island; and ii) the presence of onshore white sand beaches.

The first instrumental variable that we construct is whether or not a coastal municipality has access to an offshore island within 5 km of its coastline.[12] This measure is aimed at capturing both scenic beauty, as well as the availability of popular beach activities, such as snorkeling around the island or taking a boat trip to the offshore beaches. To measure offshore islands, we use the Mexican census of maritime land territory conducted by the INEGI. To assess the sensitivity of the 5 km cutoff, we alternatively report results using islands within 10 km of the shoreline.

The second set of instrumental variables is aimed at capturing the availability of picture-perfect white sand beaches along the Mexican coastline. Their construction using the satellite data is slightly more involved. Because an explicit quantifiable specification of what constitutes an attractive strech of beach in Mexico has not been formulated in the remote sensing literature, we proceed by binding our hands to the best existing ranking of Mexican beaches that we could find. That ranking refers to the "Eight Best Beaches of Mexico" published by the ranking analytics company U.S. News and World Report (the same company that publishes the rankings of economics graduate programs every year).[13]

We take the top four of these eight beaches, Playa del Carmen, Tulum, Cancun and Cozumel, and construct 5 alternative municipality-level beach measures using the historical satellite data. For each of these beaches, we start by computing the wavelength ranges in the six different LandSat sensors computed across all 30 m pixels that cover the beach. Online Appendix Table A.2 presents these 6x4 ranges. We then use raster processing tools in a geographical information sys-

[12] Our instrumental variables have no variation across non-coastal municipalities. Given specification (1) features coast-by-period fixed effects, it follows that the identifying variation is purely driven by coastal municipalities. We include the full sample of municipalities in Mexico to increase power when estimating additional municipality controls in X_{mct}. As discussed below, we also report results to verify that the IV point estimates are identical when estimated on the full municipality sample or on coastal municipalities only when excluding controls.

[13] In their online description, they write: "*To help you find the ideal Mexican destination for sunbathing on the sand and splashing in the waves, U.S. News considered factors like scenery, water clarity, crowd congestion, and nearby amenities. Expert insight and user votes were also taken into account when creating this list of the country's best beaches.*"

tem to classify all 30 m pixels within 100 m of the Mexican shoreline into zeroes and ones depending on whether they fall within the wavelength ranges in each of the six original LandSat raster layers. By aggregating up which pixels are within the range of all six wavelength ranges, this yields four different measures of the fraction of coastline within 100 m of the shoreline that is covered by either definition of picture-perfect beaches for each of the 150 coastal municipalities. In addition to these four instrumental variables, we also construct the fraction of 30 m pixels within 100 m of the shoreline that is covered by either of these four types of high quality beaches. Finally, to assess the sensitivity to the 100 m range, we also report results using a 200 m radius from the shoreline instead.

Having constructed these six instrumental variables (one for scenic beauty and five for beach quality), we proceed as follows. We use the island instrument and the beach quality instrument based on the top ranked beach (Playa del Carmen) as our baseline instrumental variable strategy. The identifying assumption is that the presence of an offshore island within close proximity of the shoreline or a higher fraction of coastline within 100m of the shore covered by picture-perfect sand beaches affect municipality-level economic outcomes only through their effect on local tourism activity (sales of tourism related services). To assess this assumption, we first follow the same approach as for the OLS specification and report estimation results both before and after the inclusion of the full set of municipality controls. This allows us to document the extent to which the inclusion of a number of obvious pre-determined municipality control variables may affect the baseline IV point estimates.

We then report a number of additional robustness checks. First, we test the sensitivity of the IV point estimates to excluding the origin municipality of the top ranked beach in Mexico (Playa del Carmen). This serves to address the concern that the ranking agency U.S. News partly based their ranking on the popularity of destinations by US tourists (even though they also weighed crowdedness negatively). Second, we report IV estimates using the four additional beach types while each time excluding the origin municipalities. Third, we report IV estimates after altering the 5 km cutoff for the island IV, and the 100 m cutoff for the beach IV.

Finally, we address the potential remaining concern that islands or white beaches may affect the local economy not just through their effect on local demand for tourism-related services, but also by directly affecting the amenities for local residents. Even though we try to be careful in constructing our IVs to capture a very particular set of features of the local environment that are arguably specific to beach tourism, it could be the case that these characteristics have significant direct effects on local employment and populations by directly altering the amenities of local residents (relative to other coastal municipalities in Mexico) in a discernible way. We assess the extent to which this is the case in two ways. First, we run a placebo falsification test on the identical sample of municipalities during a period before beach tourism had become a major force in Mexico. This involves the construction of a long time series of population census data for consistent spatial units for the years 1921, 1930, 1940 and 1950 in addition to the two most recent rounds of population census data 2000 and 2010. Beach tourism in Mexico started to emerge in the 1950s and 1960s. To assess the validity of the exclusion restriction, we regress log municipality population on each of the six instrumental variables for the same set of municipalities both before and after beach tourism could have significantly affected economic outcomes and thus local populations. As a second robustness check, we also verify in today's cross-section of Mexican municipalities to what extent our model-based estimates of local amenities are significantly related to the presence of islands or a higher fraction of white sand coverage along the coastline.

3.2 Estimation Results

Municipality Employment and Population Using this empirical strategy, our first aim is to estimate the effect of differences in local tourism activity on municipality-level total employment and population. To this end, we estimate specification (1) with log employment or log population on the left hand side, that we construct from the Mexican census microdata for 2000 and 2010 as described in the data section. Table 3 presents the OLS and IV estimation results for our two baseline instrumental variables (the island and our first of the five beach instruments).

Several findings emerge. First, the OLS point estimate of the effect of tourism on municpality employment changes little before and after including the full set of municipality controls, which mostly enter with the expected sign and statistically significant. Given that the majority of Mexican tourism is beach-driven and located along the coastline, and the fact that our baseline specification includes coast-by-period fixed effects, one interpretation of these first OLS results is that tourism in Mexico is determined to a large part by natural amenities, such as beaches, which appear not be correlated with some obvious observable and pre-determined control variables.

To further assess these results, columns 3-8 present the IV estimates. As for the OLS, the IV point estimates of the effect of tourism on municipality total employment move by very little before and after including the full set of controls for both the island instrument and the beach instrument, as well as when using both together. Both instruments lead to slightly higher point estimates of the effect of tourism on municipality employment in the full specifications, and both instruments yield similar point estimates as reported by the p-value of the over-identification test in columns 7 and 8. The likeliest explanation for why the IV point estimates are slightly higher than the OLS estimates is the concern of measurement error in our measure of local tourism activity, which is total establishment revenues from temporary accommodation collected in surveys from the Censos Economicos for 1998 and 2008.

The results suggest that local tourism activity has a strong and significant positive effect on total municipality employment. The elasticity is estimated to be 0.275 in the full specification with both instruments in column 8, suggesting that a 10 percent increase in local tourism activity in 1998 and 2008 leads to an increase in total municipality employment of on average 2.75 percent in 2000 and 2010 respectively. Given these estimates are based on cross-sectional variation, we interpret these results as long term effects of local exposure to tourism on municipality total employment. In reference to the descriptive statistics reported in Table 2, these results suggest that a one standard deviation in log local tourism revenue (roughly 4) leads to a doubling of municipality total employment.

Columns 9 and 10 of Table 3 report the estimation results of the IV specification using both instruments on log municipality total population instead of total employment. Interestingly, the point estimate is about 0.055 below the point estimate for employment, suggesting that a 10 percent increase in local tourism expenditure leads to an increase of 2.2 percent in total population compared to 2.75 percent in total employment. We interpret this as indicative evidence that some workers who are attracted to municipalities with more tourism activity do not end up residing in the same municipality. Having said this, 0.05 is a relatively small difference in the two point estimates. This is consistent with the raw moments in our census microdata, where the total share of workers commuting outside their residential municipality for work is 15 percent in 2000, and falls below 10 percent once we exclude the Mexico City region.

Tables 4 and 5 and Online Appendix Tables A.3 and A.4 present a series of additional robustness checks. First the Online Appendix Table A.3 confirms that our treatment of zero municipality hotel revenues in the log specification (using the IHS transformation as discussed above) is not driving the estimation results. The reason is that the identifying variation of our IV strategy stems from differences across coastal municipalities, which except for less than 5 instances report positive amounts of hotel revenues. Table A.3 reports close to identical point estimates when exchanging the IHS specification with either treating zeroes as log-of-ones, or after excluding municipalities with zero hotel revenues. Second, Online Appendix Table A.4 confirms the 10 percent census samples do not give rise to sparseness concerns for our analysis at the municipality level. To this end, we report results on total municipality population when measured from the 100 percent census samples, rather than our 10 percent samples for which we have the microdata. The point estimates are virtually identical.

Tables 4 and 5 present our main robustness checks. Table 4 first confirms that our identifying variation purely stems from differences across coastal municipalities since our instruments have no variation across inland regions, while including coast-by-period fixed effects in specification (1). In columns 1 and 2 the point estimate is identical when running the IV specification without controls on the full sample or on the coastal sample only. Including the full sample of municipalities in our full specifications, however, provides us with greater power when including additional municipality controls.

Columns 3-10 of Table 4 report estimates across different instrumental variables specifications. We first exclude the origin municipality of the highest ranked Mexican beach that our first beach IV is based on. This is to address the concern that the U.S. News ranking may have partly been based on the popularity of the destination (while they also weighted crowdedness negatively). The fact that the point estimate is virtually identical provides reassurance that the results are not driven by a particular place. In the following columns, we report IV point estimates when using the five alternative beach instruments, while also always excluding the respective origin municipality, and reporting over-identification tests relative to the island instrument. The point estimates are remarkably similar, and very slightly higher on average compared to our baseline estimates reported in Table 3. The final two columns of Table 4 then report results aimed at testing the sensitivity of the 5 km cutoff for the island instrument, and the 100 m cutoff for the beach instrument. Reassuringly, the point estimates remain practically unchanged when doubling those cutoff values to 10 km and 200 m respectively.

Table 5 presents a second set of robustness results, which are aimed at estimating a placebo falsification test. Beach tourism took off in Mexico during the 1950s and 60s, about three decades after the end of a devastating civil war that lasted for more than a decade. Before the 1960s, virtually no international tourism existed in Mexico (see Online Appendix Figure A.1). In terms of domestic tourism, one major hurdle for the development of beach tourism were prohibitively high travel costs. For example, the first major highway to connect Acapulco to Mexico City was completed in 1960. The specifications in Table 5 are thus aimed at documenting the effect of our various beach quality measures on municipality population that we construct from historical population census data in 1921, 1930, 1940 and 1950 (pre-tourism), and match to consistent spatial municipality-level units in 2000 and 2010 (post-tourism).

The table reports for each of the six instrumental variables the results of the reduced form regression (log population on IV), on identical municipality samples both before and after tourism became a major force for the Mexican economy. We include the basic set of pre-determined geographical controls in these estimations, partly to document whether the historical population data yield significant and sensible estimates on these determinants in both periods.[14] We also report these results across three panels, that deal in different ways with the important feature of the data that not all municipalities reported non-zero populations for all census rounds between 1921-2010. The first panel uses the same strategy that we use for the log hotel sales above, and uses the IHS transformation in order not to ignore zero populations. The second panel follows a conventional approach and treats zeroes as the log of one. And the third panel reports results for log populations on the left hand side, while ignoring all municipalities that ever reported zero populations.

Several results are emerge. For the island instrument, we get a slightly negative but insignificant point estimate of the effect on municipality populations before 1960, and a strong and significant positive effect afterwards in all three panels. Importantly, the estimates on the geographical municipality controls are estimated with similar precision in both periods, suggesting that the historical census population data are not just significantly noisier than the more recent rounds.

For the five remaining beach instruments, the reduced form effect on population in the recent periods is slightly less precisely estimated than that for the island instrument, but the first stage F-statistics still mostly exceed the critical value of above 10 as documented before in Tables 3 and 4. As for the island IV, the point estimate for the period before 1960 is negative and imprecisely estimated. The fact that the pre-tourism point estimates are consistently negative for all five beach instruments, and sometimes marginally statistically significant points to the fact that an abundance of attractive beaches may have been in fact negatively correlated to municipality populations along the coastline before tourism emerged (pre 1960). This pattern starts to make sense when looking at the U.S. News beach ranking: the nicest beaches are concentrated in the Caribbean part of Mexico along the Yucatan coast. These coastal municipalities were virtually empty fishing villages before tourism started growing in the region (e.g. Cancun in the 1970s and

[14]Note that we do not include the second full set of controls, as some of them are not pre-determined during these early periods. Results are virtually identical, however.

80s). Both the fact that tourism is very plausibly the main reason for why these places switched from less to more populous, and the fact that our empirical analysis is interested in cross-sectional differences in municipality populations rather than differences in growth rates –where the usual concern of mean reversion is much less relevant– provide us with reassurance that our IV point estimates are unlikely to be upward biased. Finally, the three panels of Table 5 confirm these findings across the different treatments of zero populations in our log specification on the left hand side.

Table 6 presents a second set of results aimed at assessing to what extent our IVs may affect local outcomes not through their effect on the local demand for tourism-related services, but instead through a direct effect on the amenities enjoyed by local residents. Rather than using historical data, we use today's cross-section of Mexican municipalities and verify to what extent our model-based measures of local amenities are affected by the presence of islands or any one of our five instruments aimed at capturing the presence of white sand beaches. As described in more detail in the theory section, we construct measures of local amenities as the residual of local total employment that is not explained for by regional variation in real wages. We construct these model-based measures six times. Each time, we exclude one of our instruments in all steps of the model's parameter estimation in order to ensure that there is no mechanical orthogonality condition built into the estimation of the local amenities. Consistent with the findings of the placebo falsification test above, we find that current-day estimates of local amenities are not significantly correlated with our instrumental variables. These results provide reassurance that our measures of islands or the fraction of coastline covered by picture-perfect beaches effectively capture a specific set of shifters to local tourism demand that do not appear to have discernible direct effects on local populations, or to be correlated with other omitted variables affecting local economic outcomes.

After documenting the effects of tourism on municipality total employment and population, we now switch attention to the heterogeneity of the effect of tourism on employment across different groups of the Mexican society. To this end, we use the census microdata for 2000 and 2010 to aggregate municipality populations for eight different groups that represent the full cross of three binary categories: gender (male/female), education (skilled/unskilled) and ethnicity (Hispanic/indigenous).[15] The results suggest that while the point estimates of the effect of local tourism activity are positive for all eight groups, this effect is also clearly heterogeneous across the different groups of the Mexican society. The effects appear to be on average stronger for women compared to men, for skilled relative to unskilled and for indigenous relative to Hispanic Mexicans. The two groups that appear to gain the most in terms of municipality employment are skilled male indigenous workers followed by skilled female indigenous workers. The two groups that appear to benefit the least in terms of municipality employment are unskilled male Hispanic workers followed by unskilled female Hispanic workers.

Municipality Wage Bill and GDP by Sector Table 8 reports the OLS and IV estimation results of the effect of differences in local tourism revenues on the municipality total wage bill paid, GDP

[15] Following what we do above for log hotel sales, we use the IHS transformation in cases a municipality reports zero workers in a given group. Results are very similar when instead using the log of one for zero values, and alternatively the ranking of the size of the coefficients across groups is preserved when excluding zero values in the estimation.

and GDP by sector of economic activity. Tourism has a strong and significant positive effect on local aggregate labor income and GDP. According to the IV point estimates in the full specification with both instruments, a 10 percent increase in local tourism revenues leads to 4.77 percent increase in the local wage bill, and a 4.25 percent increase in local GDP.

Given tourism only accounts for on average roughly 10 percent of total GDP in Mexico, these results suggest strong multiplier effects on the local economy.[16] Interestingly, the effect of tourism on total local GDP appears to be driven by significant positive effects on both local services GDP and local manufacturing GDP, while the point estimate on local agriculture is also positive, but not significant at conventional levels in the IV estimation.

These findings raise the important question how much of a role public investments into tourism centers (e.g. transport and other infrastructure) may play underlying these point estimates. To this end, Table 9 re-estimates the effect of tourism activity on local GDP after first excluding the five tourism centers in Mexico that were part of the goverment's so called Fondo Nacional de Fomento al Turismo (FONATUR), which invested substantial public funds into infrastructure and transport links during the 1970s and 80s for the development of Cancun, Los Cabos, Ixtapa, Huetalco, and Loreto as tourism destinations. As depicted in column 2 of Table 9, the exclusion of these tourism hubs very slightly reduces the baseline point estimate of the effect on local GDP from 0.425 to 0.383 instead.

The next three columns are aimed at further addressing the question to what extent municipalities with more local tourism activity may have higher GDP purely because they receive more public investments and fiscal transfers compared to less touristic municipalities. To this end, we obtain administrative public finance data covering the period 1989-2010 at the municipality level. We use these data to compute the average annual net public investments received by each municipality since 1989 expressed in 1998 pesos for the cross-section in 1998, or expressed in 2008 pesos for the cross-section in 2008. Since we do not have a valid instrument to include fiscal transfers as a control variable on the right hand side, we instead make different assumptions about the fiscal multiplier of public funds on local GDP, and then accordingly subtract the average annual net fiscal transfers on the left hand side of the regression. When the fiscal multiplier is equal to one, we simply subtract net public investments from local GDP on the left hand side and take the logarithm of net GDP. We also compute this variable for less conservative fiscal multipliers of 2 and 3 in the final columns of the table. Reassuringly, public investments over the period that we have data for (since 1989) have virtually no effect on the estimated GDP effects of tourism regardless of the assumptions on the size of the fiscal multipliers. We interpret the robustness of the estimated effect of tourism on local GDP to both excluding government-sponsored tourism centers and netting out public transfers as a sign that public funds are unlikely a key driver of the estimated effects in this section.

[16]Note that we lack information on the share of total tourism sales in GDP at the municipality level, which we would need to estimate this share separately across coastal and non-coastal municipalities. Having said this, assuming a constant share of hotel sales in total tourism expenditure, the average share of tourism in local GDP is roughly 20 percent among coastal municipalities.

Wages Table 10 estimates the effect of local tourism expenditure on average municipality wages, and wages broken up by group of the Mexican society. The dependent variable of central interest here are Mincerized log wage residuals as described in the data section. We find that changes in local tourism exposure have a positive effect on wages with an elasticity of 0.033 in the full IV specification with both instruments. This would imply that a 10 percent increase in local tourism revenue leads to an increase of 0.33 percent in local wages (after flexibly controlling for age, education, gender and ethnicity). This effect appears to be strongest among unskilled female Hispanic workers, unskilled female indigenous workers and unskilled male Hispanic workers, and with negative but insignificant point estimates for skilled male and female indigenous workers. Given the unbalanced nature of the wage data across municipalities (since not every municipality reports workers of all types), however, some caution should be noted with respect to these last two groups.

4 Theoretical Framework

In the previous section we have estimated a number of reduced form effects of variation in local tourism activity on economic outcomes in today's cross-section of Mexican municipalities. These reduced form results leave a number of important questions unanswered.

First, the estimates are by construction relative, since the empirical setting is based on comparing outcomes across regions with higher or lower levels of local tourism activity in a given period. We do not have a valid empirical counterfactual that would allow us to observe Mexican country-level long run economic outcomes subject to states of the world with more or less tourism. Therefore, a more structured approach is required to evaluate the aggregate national implications of tourism (e.g. Kline & Moretti (2014)). To that end, we write down below a spatial equilibrium model.

Second, rationalizing the reduced-form estimates of the previous section through the lens of a spatial equilibrium model is also important for our understanding of the relative regional implications of tourism. For instance, given our interest in long run effects, the observed reduced form effects of tourism on local incomes and prices do not map into differential welfare implications of tourism across regions. This is because, as we report above, local populations and employment strongly respond to differences in tourism activity, suggesting that the regional welfare differentials due to tourism activity have been arbitraged away by mobile labor over the long run (since the 1950s).

Third, the previous section suggests that tourism has strong positive effects on local economic activity, both directly and indirectly, i.e. through its effect on other sectors. In particular, tourism has a significant positive effect on nominal manufacturing GDP. To what extent are these estimated multiplier effects a sign of possible productivity spillovers between the tourism industry and traded goods production? The answer is a priori unclear, as this result could be driven by productivity effects, but also by local price effects. Furthermore, to the extent that they do reflect productivity spillovers, it is a priori unclear whether these local effects on manufacturing may be offset by a decrease in agglomeration forces in other non-touristic regions of the country. These questions also feed back into the welfare evaluation of tourism. Depending on the sign and magnitude of the within and cross-sector spillovers, the aggregate gains from tourism can either be magnified or diminished compared to the conventional gains from market integration in tourism.

To make progress on these questions and guide the estimation of the welfare implications of tourism in the long run, we propose a spatial equilibrium model of trade in goods and tourism services. The following subsections outline the model and estimation equations, Section 5 presents the empirical estimation and calibration, and Section 6 presents the counterfactual analysis.

4.1 Model Setup

The theoretical framework extends Redding (2015) to allow for trade in tourism-related services in addition to trade in manufacturing goods across regions and countries. The model features regions within Mexico that differ in three dimensions: their level of productivity for manufacturing goods, their level of attractiveness for tourism, and their level of local amenities for residents. Furthermore, regions are linked economically through three ties. First, they trade goods with each other and the rest of the world. Second, they host international and domestic tourists that spend part of their income outside of their region of residence. Third, workers are mobile and choose their region of residence within countries.

The model is static and aims at capturing the long run equilibrium of the economy. The world is comprised of N regions indexed by n. Labor is mobile between regions within countries but not between countries. The subset $\mathcal{M} \subset (1..N)$ corresponds to the regions of Mexico. The subset $\overline{\mathcal{M}}$ designates countries other than Mexico. For simplicity, we do not model intra-country heterogeneity for them. The total population of each country is taken as given: for countries other than Mexico, L_n for $n \in \overline{\mathcal{M}}$ is exogenous; for Mexico, total population $L_{\mathcal{M}} \equiv \sum_{n \in \mathcal{M}} L_n$ is also given. In contrast, the share of workers in each Mexican region $\frac{L_n}{L_{\mathcal{M}}}$ for $n \in \mathcal{M}$ is an endogenous outcome, determined in spatial equilibrium.

4.1.1 Preferences

In each region $n \in 1..N$, there is a population of L_n workers. Each worker supplies one unit of labor inelastically. Workers derive utility from the consumption of a bundle of goods and services, denoted C_n for workers living in region n. They also derive utility from the local amenities of the region where they live. We allow for that level of attractiveness of a region to respond endogenously to how populated a region is. This aims to capture, in a reduced form way, the notion that more populated regions can be either more congested, leading to a decrease in the utility of local residents, or more attractive, as the concentration of population gives rise endogenously to better local amenities (e.g. more sources of entertainement, variety in consumption, etc). Following Allen & Arkolakis (2014), we summarize these forces by positing that local amenities in region n are:

$$B_n L_n^{\epsilon},$$

where the elasticity of local amenities to local population ϵ can be negative if more populated region are on net more congested, or positive if agglomeration effects for consumption amenities dominate. Finally, each worker has a set of idiosyncratic preferences for living in different regions in his country. We denote this vector of idiosyncratic preferences $\varepsilon_n(\omega)$ for worker ω and regions n of his own country, and assume that they are drawn from a Frechet distribution with mean 1 and dispersion parameter κ. To summarize, the utility of a worker living in region n is:

$$U_n(\omega) = \varepsilon_n(\omega) C_n B_n L_n^{\epsilon}, \tag{2}$$

and workers within Mexico choose to live in the region that maximizes their utility, so that:[17]

$$U(\omega) = max_{n \in \mathcal{M}} \varepsilon_n(\omega) C_n B_n L_n^{\epsilon}.$$

The goods and services workers consume are a bundle of local services (C_s), tourism-related services (C_T) and manufacturing goods (C_M), according to the following preferences:[18]:

$$C_n = \left(\frac{\left[C_{M,n}^{\frac{\rho-1}{\rho}} + C_{T,n}^{\frac{\rho-1}{\rho}} \right]^{\frac{\rho}{\rho-1}}}{1-\alpha} \right)^{1-\alpha} \left(\frac{C_{S,n}}{\alpha} \right)^{\alpha}, \tag{3}$$

where the elasticity of substitution between tourism services and manufactured goods is $\rho > 1$. Local services represent a constant share of spending.[19] The manufacturing good index is a CES aggregate of the consumption of a continuum of individual goods with elasticity of substitution σ_M, so that:

$$C_{M,n} = \left[\int c_{M,n}(i)^{\frac{\sigma_M - 1}{\sigma_M}} di \right]^{\frac{\sigma_M}{\sigma_M - 1}},$$

and the price index for manufacturing goods is:

$$P_{M,n} = \left[\int p_{M,n}(i)^{1-\sigma_M} di \right]^{\frac{1}{1-\sigma_M}}.$$

Workers living in region n consume a bundle of tourism-related services $C_{T,n}$. They travel to various destination regions including abroad to consume these services. We assume that tourism-related services are differentiated by region of destination. The bundle of tourism-related services consumed by a worker living in region n is a CES aggregate of the services consumed in each

[17] The idiosyncratic preferences and local amenities play no role in the model for workers outside of Mexico as we do not model intra-country heterogeneity for these countries.

[18] More generally, the demand function can be parameterized as $\left[\beta_S C_s^{\rho} + \beta_S C_T^{\rho} \right]^{\frac{\alpha}{\rho}} C_M^{1-\alpha}$, but the preferences weights β_S and $\beta_T$that capture the relative strength of consumer tastes for each goud cannot be separately identifed from difference in productivities in these two sectors, so we normalize these weights to 1. The calibrated productivities in each sector should be understood therefore as capturing both a productivity effect as well as demand weights.

[19] This is consistent in particular with the interpretation of this local spending as housing expenditure. (Davis & Ortalo-Magné, 2011) show that housing expenditure consitute a nearly constant fraction of household income.

region i:[20]

$$C_{T,n} = \left[\sum_{i \neq n} A_i^{\frac{1}{\sigma_T}} c_{T,i}^{\frac{\sigma_T - 1}{\sigma_T}} \right]^{\frac{\sigma_T}{\sigma_T - 1}},$$

where σ_T is the elasticity of substitution between the various touristic destinations, $c_{T,i}$ is the amount of tourism-related services consumed in region i and A_i is a taste shifter for each destination region i. It summarizes the quality of the local site for tourism. For example, a site with attractive beaches or a rich set of historical buildings is more attractive for tourists. Given the demand function, the price index Γ_n of tourism-related services for the inhabitants of region n is:

$$\Gamma_n = \left(\sum_{i \neq n} A_i {p_{T,ni}}^{1-\sigma_T} \right)^{\frac{1}{1-\sigma_T}},$$

where $p_{T,ni}$ is the price of tourism services in i for tourists coming from region n.

Given that demand, the share of region n spending on tourism services that is spent on tourism services in region i is:

$$\lambda_{ni} = \frac{A_i {p_{H,ni}}^{1-\sigma_T}}{\sum_{k=1}^{N} A_k {p_{H,nk}}^{1-\sigma_T}}. \tag{4}$$

Furthermore, given the demand function (3), the share of total spending in region $n$spent on manufactured goods is:

$$(1-\alpha)\chi_n = (1-\alpha) \frac{P_n^{1-\rho}}{PT_n^{1-\rho}},$$

where PT_n is the composite price index for the bundle of manufactured and tourism goods in region n:

$$PT_n = \left(P_n^{1-\rho} + \Gamma_n^{1-\rho} \right)^{\frac{1}{1-\rho}}.$$

4.1.2 Production

Manufacturing The structure of the model for the production and consumption of manufactured goods follows Eaton & Kortum (2002). In addition, we allow for the possibility of production externalities: the local productivity of a region for manufacturing goods can respond to the level of local activity.

There is a continuum of goods that can be produced in any region of the world. Each region i has a fundamental productivity level M_n for the production of manufacturing goods. To allow for the possibility of production externalities in manufacturing, we decompose this productivity into an exogenous component M_n^o and and endogenous component that responds to the level of local economic activity. We allow this externality to stem from the level of economic activity in the traded goods sector (manufacturing) (L_M) and/or the level of economic activity in the services

[20] In reality, each tourist tends to visit very few regions. As shown in Anderson et al. (1992), the CES assumption made for a representative worker is isomorphic to the aggregation of a continuum of discrete choices made by individual consumers.

sector ($L_{ST} = L_T + L_S$). In each case, the externality increases with the size of economic activity with a constant sector-specific elasticity denoted respectively γ_M and γ_S, so that:

$$M_n = M_n^o L_{M,n}^{\gamma_M} L_{ST,n}^{\gamma_S}. \tag{5}$$

This is a reduced form expression that is aimed at summarizing the channels through which local tourism expenditures could have positive or negative effects on manufacturing in the long run - aside from the usual price and wage effects that are captured by the spatial equilibrium model. For example, it has been hypothesized that tourism could act as a special case of the "Dutch Disease" and attract activity away from innovation-intensive traded industries (Copeland, 1991), so that in the long run innovation is reduced and productivity falls in these sectors. Expression (5) indeed allows for tourism to have such adverse long run economic consequences. Assume for example that $\gamma_M > 0$ but $\gamma_S = 0$. In that case, the development of tourism attracts workers away from manufacturing, a sector in which scale matters for productivity, causing a decrease in manufacturing productivity. On the other hand, tourism could give rise to productivity spillovers that would not have materialized otherwise. This is the case for example when $\gamma_S > 0$ while $\gamma_M = 0$. For example, tourism revenues could loosen credit constraints locally and thereby improve outcomes in the manufacturing sector, leading to positive spillovers form the development of the services sector on manufacturing. In that case, the development of tourism generates productivity gains for manufacturing.

As in Eaton & Kortum (2002), regions draw random productivity levels z for each good from a Frechet distribution with shape parameter θ:

$$F(z) = e^{-Z^{-\theta}}.$$

To export a good from region i to region n, firms incur an iceberg trade cost τ_{ni}. Firms behave competitively and consumers source from the lowest cost region, so that, given the properties of the Frechet distribution, the share of traded good spending that consumers from region n spends on goods produced region i is:

$$\pi_{ni} = \frac{(\tau_{ni} w_i)^{-\theta} M_i^{\theta}}{\sum_{k=1}^{N} (\tau_{nk} w_k)^{-\theta} M_k^{\theta}}, \tag{6}$$

and the price index for the traded good for consumers residing in region n is P_n where:

$$P_n^{-\theta} = K_1 \sum_{k=1}^{N} (\tau_{nk} w_k)^{-\theta} M_k^{\theta}. \tag{7}$$

where $K_1 = \left(\Gamma(\frac{\theta - \sigma_M + 1}{\theta})\right)^{\frac{1}{1-\sigma_M}}$ is a constant.

Tourism-Related Services We assume that the cost of tourism-related services consists of two elements, combined in a log-linear way. First, costs depend on the services produced in the destination region. We assume that they are produced under perfect competition using local labor with constant returns to scale:

$$q_{T,n} = L_{T,n},$$

where $L_{T,n}$ is the local workforce working in the tourism industry and $q_{T,n}$ is the quantity of tourism services produced in region n. The second element consists of transportation costs from the region of residence to the region visited, as well as a set of other barriers to tourism (cultural differences between region, language barrier, duration of travel , etc). We summarize these frictions by a parameter t_{ni} that is specific to a pair if region of origin n - destination region i.[21] Overall, we assume that the price of consuming a bundle of tourism-related services for a resident of region n visiting region i is:

$$p_{T,ni} = w_i t_{ni}.$$

The price index for the bundle of tourism-related services for a resident of region n is therefore:

$$\Gamma_n = \left(\sum_{i \neq n} A_i t_{ni}^{1-\sigma} {w_i}^{1-\sigma} \right)^{\frac{1}{1-\sigma}}. \quad (8)$$

Local services Finally, local services are produced and consumed by local residents. They are produced using local labor with constant returns to scale and productivity R_n, so that[22]:

$$q_{S,n} = R_n L_{S,n},$$

and

$$p_{S,n} = \frac{w_n}{R_n}.$$

Since R_n is not identified from the level of local amenities B_n in what follows, we choose to normalize $R_n = 1$ and interpret B_n as indicating a combination of the level of local amenities and the productivity of the local services.

Trade Deficits To account for the fact that there are systematic transfers between regions in Mexico and trade deficits between countries, we assume that the total income of a region i is $y_i L_i = w_i L_i + D_i$, where D_i is the local trade deficit. Local trade deficits are a series of transfers such that:

$$\sum_{i=1}^{N} D_i = 0$$

The aggregate trade deficit of Mexico, $D_{\mathcal{M}}$, is:

$$D_{\mathcal{M}} = \sum_{i \in \mathcal{M}} D_i$$

As in Caliendo & Parro (2014), trade deficits are exogenous to the model. They allow the quantified model to match the observed trade and tourism data.

[21] As is commonly done in the trade literature, we do not model explicitly the transportation industry. In this context, it is the industry that provides transportation to tourists between their region of residence and their travel destination. The impact of the corresponding costs is captured in a reduced-form way in the bilateral tourism frictions t_{ni}, that may systematically vary with the distance between n and i.

[22] These services can be interpreted as housing. Formally modeling housing as in Redding (2015) leads to isomorphic expressions.

4.2 Equilibrium

Income per capita in region $n \in (1..N)$ is

$$y_n = w_n + \frac{D_n}{L_n} \tag{9}$$

Therefore, a worker who lives in region n consumes a bundle $C_n = \left(\frac{\left[C_{M,n}^{\frac{\nu-1}{\nu}} + C_{T,n}^{\frac{\nu-1}{\nu}} \right]^{\frac{\nu}{\nu-1}}}{1-\alpha} \right)^{1-\alpha} \left(\frac{C_{S,n}}{\alpha} \right)^{\alpha}$,

so that:

$$C_n = \frac{y_n}{w_n^{\alpha} P T_n^{1-\alpha}}.$$

Mexican workers choose in which region to live within Mexico. Given the properties of the Frechet distribution and the workers' utility maximization problem in (2), the share of Mexican workers who choose to live in region $n \in \mathcal{M}$ is:

$$\frac{L_n}{L_{\mathcal{M}}} = \frac{(B_n L_n^{\epsilon} C_n)^{\kappa}}{\sum_{k \in \mathcal{M}} \left(B_k L_k^{\epsilon} C_n \right)^{\kappa}}, \text{ for } n \in \mathcal{M}. \tag{10}$$

Outside of Mexico, other countries' populations L_n for $n \in \overline{\mathcal{M}}$ are given exogenously.

Finally, the three market clearing conditions for the manufacturing goods market, the tourism services market and the market for local services lead to the following system of $3 \times N$ wage equations that closes the model:

$$w_i L_{i,M} = (1-\alpha) \sum_{n=1}^{N} y_n L_n \chi_n \pi_{ni}, \text{ for } n \in (1..N). \tag{11}$$

$$w_i L_{i,T} = (1-\alpha) \sum_{n=1}^{N} y_n L_n (1\text{-}\chi_n) \lambda_{ni}, \text{ for } n \in (1..N). \tag{12}$$

$$w_i L_{i,S} = \alpha y_i L_i, \text{ for } n \in (1..N). \tag{13}$$

Equations (6)- (8) and (9)-(13) define the equilibrium of the economy.

4.3 Welfare Impact of Tourism Integration

The model lends itself naturally to welfare analysis. We use as a measure of welfare in a region the average utility level enjoyed by workers who live in this region. In a given spatial equilibrium, because of the free mobility of workers and the properties of the Frechet distribution, this level of welfare is equalized across all Mexican regions. To quantify how this representative level of welfare is impacted by the development of tourism in Mexico, we need to solve for a counterfactual equilibrium without tourism integration, and compare welfare between the current equilibrium and the counterfactual.

To this end, we first derive the expression for welfare per capita in Mexico in a given spatial equilibrium. We then derive an expression for how welfare changes between two equilibria with different levels of frictions to tourism. This expression depends on how several endogenous variables change between the two equilibria. Finally, we describe how we solve for these changes in endogenous variables between the current equilibrium and a counterfactual one without tourism integration.

4.3.1 Expression for Aggregate Welfare

Given the properties of the Frechet distribution and the workers' utility maximization problem in (2), the common level of welfare in the Mexican economy is:

$$U_{\mathcal{M}} = K_2 \left[\sum_{k \in \mathcal{M}} \left(B_k L_k^{\epsilon} \frac{y_k}{w_n^{\alpha} PT_n^{1-\alpha}} \right)^{\kappa} \right]^{\frac{1}{\kappa}}. \tag{14}$$

where $K_2 = \Gamma(\frac{\kappa-1}{\kappa})$ is a constant. Welfare is an harmonic average across all regions of a measure of local utility that includes local real income and local amenities. The parameter κ measures how weak idiosyncratic preferences of workers are for different regions. When this parameter is high, regional labor supply responds very elastically to regional differences in amenities-adjusted real income. In turn, aggregate welfare responds strongly to the level of real income in the most attractive region. At the limit when $\kappa \to \infty$, welfare is simply proportional to $\max_{k \in \mathcal{M}} B_k L_k^{\epsilon} \frac{y_k}{\Gamma_k^{\alpha} P_k^{1-\alpha}}$.

Alternatively, combining equations (10) and (14) leads to the following expression for per-capita welfare in Mexico that holds for any region $n$in Mexico:

$$U_{\mathcal{M}} = K_3 B_n \frac{y_n}{w_n^{\alpha} PT_n^{1-\alpha}} L_n^{\frac{\kappa\epsilon-1}{\kappa}}, \ \forall n \in \mathcal{M}. \tag{15}$$

where the constant K_3 is equal to $\Gamma(\frac{\kappa-1}{\kappa})^{-1} L_{\mathcal{M}}^{\frac{1}{\kappa}}$.

4.3.2 Expression for Change in Welfare

Using expression (15), it follows that difference in welfare between two equilibria is identical across all regions, irrespective of their level of openness, because of free mobility. Difference in welfare takes the following expression, valid for any region $n \in \mathcal{M}$,

$$\widehat{U_{\mathcal{M}}} = \widehat{\left(\frac{y_n}{w_n}\right)}^{\alpha} \widehat{\left(\frac{y_n}{PT_n}\right)}^{1-\alpha} \widehat{L_n}^{\frac{\kappa\epsilon-1}{\kappa}} \ \forall n \in \mathcal{M}.$$

The hat notation indicates percentage changes. For a variable x, we write $\widehat{x} = \frac{x'}{x}$where x the value in the current equilibrium (observed in the data) and x' is the counterfactual value of the same variable in the counterfactual equilibrium. To evaluate these welfare gains/losses, we need to quantify how (y_n, L_n, w_n, PT_n) change when Mexico's level of openness to tourism changes.

To this end, we follow the methodology introduced by Dekle et al. (2007) and generalized to spatial equilibria by Caliendo et al. (2014) and Redding (2015). We first define more precisely which counterfactual equilibrium we use as a reference to estimate the welfare gains from the development of tourism in Mexico, then write the system of equation that allows to solve for the change in welfare in Mexico between the baseline equilibrium and this counterfactual.

4.3.3 Definition of the Counterfactual Equilibria

We consider two counterfactual worlds in turn. In the first one, we assume that frictions to international tourism become prohibitive but there is still inter-regional tourism within the borders of Mexico. In terms of changes compared to the current equilibrium, this corresponds to the following changes in frictions to tourism:

$$\begin{aligned} \widehat{t_{ni}} &= 1 \text{ if } (n,i) \in \mathcal{M} \times \mathcal{M}, \\ \widehat{t_{ni}} &= 1 \text{ if } (n,i) \in \overline{\mathcal{M}} \times \overline{\mathcal{M}}, \\ \widehat{t_{ni}}^{-1} &= 0 \text{ if } (n,i) \in \overline{\mathcal{M}} \times \mathcal{M}, \\ \widehat{t_{ni}}^{-1} &= 0 \text{ if } (n,i) \in \mathcal{M} \times \overline{\mathcal{M}}. \end{aligned}$$

All other exogenous parameters are held constant. In the second one, we investigate the case in which both international tourism and inter-regional travel for Mexicans are shut down. This corresponds to the following changes in frictions to tourism:

$$\begin{aligned} \widehat{t_{ni}} &= 1 \text{ if } n = i, \\ \widehat{t_{ni}}^{-1} &= 0 \text{ if } n \neq i. \end{aligned}$$

We also need to make assumptions as to what trade deficits are in the counterfactual equilibria. In both counterfactual equilibria, we assume that aggregate country-level deficits stay at their current levels for each country in proportion of world GDP. Within Mexico, we lack detailed data on interregional transfers and interregional trade that would allow us to quantify the local levels of trade deficits. Therefore, we make the simplifying assumption that local deficits are proportional to local GDP, with a constant proportion pinned down by the level of the aggregate deficit in Mexico in each equilibrium. We explore alternative assumption as robustness checks.

4.3.4 Solving for Counterfactual Changes

Given the expression for the prices indexes (7) and (8), the expression for trade and tourism shares, (6) and (4), and the expression of manufacturing productivity (5), changes in trade shares and prices between two equilibria are simple functions of changes in wages and local populations working in the services or the manufacturing sector:

$$\widehat{\pi_{ni}} = \frac{\widehat{w_i}^{-\theta}\widehat{L_{M,i}}^{\gamma_M}\widehat{L_{ST,i}}^{\gamma_S}}{\widehat{P_n}^{-\theta}} \tag{16}$$

$$\widehat{P_n}^{-\theta} = \sum_j \pi_{nj}\widehat{w_j}^{-\theta}\widehat{L_{M,i}}^{\gamma_M}\widehat{L_{ST,i}}^{\gamma_S} \tag{17}$$

$$\widehat{\lambda_{ni}} = \frac{\widehat{w_i}^{1-\sigma_T}\widehat{t_{ni}}^{1-\sigma_T}}{\widehat{\Gamma_n}^{1-\sigma_T}} \tag{18}$$

$$\widehat{\Gamma_n}^{1-\sigma_T} = \sum_j \lambda_{nj}\widehat{t_{nj}}^{1-\sigma_T}\widehat{w_j}^{1-\sigma_T} \tag{19}$$

$$\widehat{\chi_n} = \frac{\widehat{P_n}^{1-\rho}}{\widehat{PT_n}^{1-\rho}} \tag{20}$$

$$\widehat{PT_n}^{1-\rho} = \left((1-\chi_n)\widehat{\Gamma_n}^{1-\rho} + \chi_n\widehat{P_n}^{1-\rho}\right), \tag{21}$$

Given the assumptions made on trade deficits, trade deficits in the new equilibrium are pinned down by:

$$\begin{cases} D_n' & = D_n \frac{\sum_{i=1}^N w_i' L_i'}{\sum_{i=1}^N w_i L_i} \; \forall n \notin \mathcal{M} \\ \sum_{m\in\mathcal{M}} D_m' & = \left(\sum_{m\in\mathcal{M}} D_m\right) \frac{\sum_{i=1}^N w_i' L_i'}{\sum_{i=1}^N w_i L_i} \\ D_n' & = \left(\sum_{m\in\mathcal{M}} D_m'\right) \frac{w_n' L_n'}{\sum_{m\in\mathcal{M}} w_m' L_m'} \; \forall n \in \mathcal{M} \end{cases} \tag{22}$$

The vector of changes in local nominal incomes is given by:

$$\widehat{y_n} = \frac{w_n' + \frac{D_n'}{L_n'}}{w_n + \frac{D_n'}{L_n}} \tag{23}$$

Change in local population levels within Mexico stems from the location choice equation (10) together with the maintained assumption that total population is unchanged in the counterfactual equilbrium, i.e. $\sum_{n\in\mathcal{M}} L_n' = L_{\mathcal{M}}$:

$$\widehat{L_n} = \frac{\widehat{y_n}^{\frac{\kappa}{1-\kappa\epsilon}}\widehat{w_n}^{-\frac{\kappa\alpha}{1-\kappa\epsilon}}\widehat{PT_n}^{-\kappa\frac{1-\alpha}{1-\kappa\epsilon}}}{\sum \frac{L_i}{L_{\mathcal{M}}}\widehat{y_i}^{\frac{\kappa}{1-\kappa\epsilon}}\widehat{w_i}^{-\frac{\kappa\alpha}{1-\kappa\epsilon}}\widehat{PT_i}^{-\kappa\frac{1-\alpha}{1-\kappa\epsilon}}} \; \forall n \in \mathcal{M}. \tag{24}$$

Finally, the system is closed by the market clearing conditions in each sector:[23]

[23] We distinguish the 3 local labor market clearing condition to make apparent how the value of L_M and $L_T + L_S$, relevant for the spillover effects, is solved for. In a world without externalities, a single equation summing up the three constraints suffices to pin down the equilibrium wages, as the three sectors share a common wage that adjusts so that market clear. The three market clearing equations define the split of local employment between the three sectors.

$$w_i' L_{T,i}' = (1-\alpha) \sum_{n=1}^{N} (w_n' L_n' + D_n')(1-\chi_n')\lambda_{ni}'. \quad (25)$$

$$w_i' L_{M,i}' = (1-\alpha) \sum_{n=1}^{N} (w_n' L_n' + D_n')\chi_n' \pi_{ni}'. \quad (26)$$

$$w_i' L_{i,S}' = \alpha(w_i' L_i' + D_i') \quad (27)$$

$$L_i' = L_{M,i}' + L_{T,i}' + L_{S,i}' \quad (28)$$

Knowing the values of $(\pi_{nj}, \lambda_{nj}, \chi_n, w_n, L_{M,n}, L_{T,n}, L_{S,n}, D_n)$ in the baseline equilibrium, the parameters of the model (α, σ, θ, ν, $\frac{\kappa}{1-\kappa\epsilon}$) and the change in frictions $\widehat{t_{ni}}$, the system of equations (16)-(26) defines the counterfactual equilibrium. This equilibrium is unique under a set of parameter restrictions, as shown in the Appendix.

4.4 Distribution of the Gains from Tourism across Groups

We extend the framework to model various subgroups of the population, following Galle et al. (2014).

[Work in progress.]

5 Estimation and Calibration of the Model

5.1 Methodology

To quantify the long run economic impact of tourism in Mexico, the analysis proceeds in three consecutive steps. In the first step, we calibrate the model to the reference equilibrium corresponding to the current level of trade and tourism frictions, using wages, employment and trade data on the one hand, and estimates for the trade elasticity θ and the tourism elasticity σ_T on the other hand. We detail below how we use the data at hand to calibrate the model. Importantly, this step does not require estimating the spatial labor supply elasticity nor the spillover function. This first step allows us to recover a vector of –possibly endogenous– model-based manufacturing productivities M_n and a set of local demand shifters for tourism A_n.

In the second step, we estimate the reduced form spatial labor supply elasticity $\frac{\kappa}{1-\kappa\epsilon}$. We derive an estimating equation from the model, and exploit the instrumental variables for local beach quality that we discuss in Section 3 as a set of exogenous shifters to local real wages to identify $\frac{\kappa}{1-\kappa\epsilon}$. This procedure requires an estimate of the local price indices for tourism and other consumption for which sufficiently rich available data do not exist in our empirical setting.[24] To circumvent this issue, we use the model-consistent price indices that we calibrated in the first step. Importantly, this step does not require knowledge of the spillover function.

In the third step, armed with all of the relevant parameters of the model, we investigate the existence of productivity spillovers both within manufacturing and between tourism and manufacturing using indirect inference. We use two sets of reduced form empirical estimates from section

[24]Note that consumption microdata such as the AC Nielsen Mexican consumer panel focus on relatively large cities and would only cover a fraction of coastal municipalities (less than 20).

3 to calibrate the spillover function. The first empirical fact is the estimated elasticity of manufacturing GDP with respect to tourism GDP in the current spatial equilibrium (Table 8). The second empirical fact is the orthogonality of the distribution of economic activity pre-tourism to current tourism GDP when instrumented by a set of exogenous shifters of tourism revenues (Table 5). We replicate the first empirical fact using the calibrated model at the current level of frictions, and the second empirical fact using the model with the same parameters, but simulated at a counterfactual equilibrium corresponding to prohibitive inter-regional tourism frictions. Matching these reduced form moments imposes a strong discipline on how manufacturing productivities T_n can be decomposed between an exogenous part, independent of the level of economic activity, and an endogenous part, coming from within and cross-sector production externalities.

5.2 Calibration of the Baseline Equilibrium

To calibrate the baseline equilibrium, we follow a methodology close to the one laid out by (Redding, 2015). Using direct data on $(w_n, L_{M,n}, L_{T,n}, L_{S,n}, D_n)$, a parametric specification for the trade and tourism frictions (τ_{ij}, t_{ij}) and estimates for the elasticities (θ, σ_T, ρ), we recover the only vectors of local manufacturing productivities and local demand shifters for tourism (M_n, A_n), for $n \in \mathcal{M}$, that are consistent with the data (up to a normalization factor).

5.2.1 Data

The model is calibrated to the mean outcomes for 2000 and 2010 as the baseline period.[25] In order to limit the computing requirements, we aggregate the data coming from each of the 2455 Mexican municipalities described in the reduced form empirical exercise into a set of 300 regions. In particular, we keep the 150 coastal municipalities unchanged, but aggregate the interior municipalities to 150 economic centers that are located at the centroids of the largest 150 interior municipalities (in terms of mean GDP in 2000 and 2010).[26] As we show in the Online Appendix, this is without loss of generality as the key empirical moments that we match with the model are identified off variation among coastal municipalities.

Mincerized wages are our preferred measure of local wages. They allow to control for sources of heterogeneity that the model does not account for. Employment is our preferred measure of local population for all Mexican municipalities. To estimate the share of employment in tourism and manufacturing in each Mexican region, we follow the assumption already made above, that hotel sales are a constant proportion of local tourism GDP. We then proxy for the share of employment in tourism (resp. manufacturing) in each Mexican region by computing the ratio of hotel sales to manufacturing GDP in each region, and scaling these ratios so that in the aggregate, the ratio of tourism GDP to manufacturing GDP equals the one from the data. Finally, we calibrate the share of employment in local services such that aggregate GDP in all services matches the aggregate data for Mexico.

For simplicity, we aggregate all countries but Mexico into a "Rest of the World" ("RoW") aggregate. Population of RoW is adjusted so that the ratio of GDP of Mexico to the GDP of RoW equals

[25] The detailed procedure and data sources are reported in the Online Appendix.

[26] The remaining interior regions are assigned to the closest of the 150 interior centroids.

the ratio computed in the data. The shares of workers in the manufacturing and tourism industry for RoW are calibrated to the share of GDP in each industry. Finally, the share of consumption of local services is read from the share of world GDP in services, tourism excluded.

There is no available data on bilateral trade between municipality pairs within Mexico. To calibrate these shares using the available data, we use a parametric specification of the frictions to trade and tourism within Mexico. There is a long literature finding robust evidence that trade flows decay with distance with a constant elasticity close to 1 ((Mayer, 2014)). We therefore parametrize trade fictions within Mexico such that

$$\tau_{nj}^{-\theta} = d_{nj}^{-D_M}, \text{ for } (n, j) \in \mathcal{M} \times \mathcal{M},$$

where $D_M = 1$, where d_{nj} is the distance between the centroid of the two municipalities n and j. We follow a similar parametrization for tourism flows. To estimate the distance decay of tourism flows, we run a model-based gravity equation on country-level bilateral tourism exports, taking the log of equation (4) aggregated at the country level:

$$logE_{H,knt} = \delta_{kt} + \zeta_{nt} - D_H \, ln \, d_{nk} + X_{nk} + \nu_{knt}, \tag{29}$$

where $E_{H,knt}$ is the spending of country k on tourism in country n in year t, δ_{kt} is an country of origin-by-year fixed effect, ζ_{nt} is a destination country-by-year fixed effect, X_{nk} are three dummy variables capturing other sources of frictions to international tourism besides distance, such as whether countries share a common border, language or colonial ties. Finally, d_{nk} is our regressor of interest, the distance between country n and k. As can be seen in Figure 2, tourism flows are very clearly subject to gravity, with a tightly estimated distance decay elasticity of $D_H = 1.46$. We therefore parametrize tourism fictions within Mexico as varying with distance, such that:

$$t_{nj}^{1-\sigma} = d_{nj}^{-D_H}, \text{ for } (n, j) \in \mathcal{M} \times \mathcal{M}.$$

Finally, international frictions, in tourism and in manufacturing, are calibrated so that the model exactly matches the aggregate trade data in manufactured goods and tourism between Mexico and the rest of the world.[27] The aggregate Mexican deficit is also directly taken from the data.[28]

5.2.2 Tourism and Trade Elasticities

We use the panel data on country-level bilateral tourism exports to estimate the tourism elasticity. Equation (4) leads to the following estimating equation for σ_T:

$$logE_{H,knt} = \delta_{kt} + \zeta_{nk} + (1 - \sigma_T) \, ln \, w_{nt} + \nu_{knt}, \tag{30}$$

[27] Given that we aggregate all international trade flows into a single foreign country, we further make the assumption that frictions to international trade between Mexico and that synthetic country are symmetric and do not vary systematically across Mexican regions.

[28] As mentioned above, given data availability, we assume that local trade deficits within Mexico are in constant proportion of local GDP. This pins down the full vector of D_n.

where $E_{H,kn}$ is the spending of country k on tourism in country n during time t, δ_{kt} is an origin-by-time fixed effect (e.g. capturing productivity shocks), ζ_{nk} is an origin-by-destination fixed effect (e.g. capturing distances or cultural proximity), $ln\, w_{nt}$ is the relative consumption price of tourism services across destinations and ν_{knt} is a mean zero measurement error term. To empirically measure $ln\, w_{nt}$, we use country-level PPP rates for final consumption goods that the International Price Comparison (ICP) program computes for all 115 countries over the period 1990-2011 in our database. The ICP constructs this measure, PPP_{nt} as the number of units of a country n's currency required to buy the same basket of goods and services in the domestic market as one US Dollar would buy in the United States. To measure $ln\, w_{nt}$, we take the log of $(1/PPP_{nt})$. Given the inclusion of origin-by-period and origin-by-destination fixed effects, this measure effectively captures (with some error) relative consumption price changes across different destination countries from the point of view of a given origin-by-time cell.

The main concern for the identification of $(1 - \sigma_T)$ is that changes in consumption prices across destinations are correlated with other factors that may increase or decrease bilateral tourism flows in the error term. For example, if prices in a destination increase at the same time that travelers at the origin become more likely to travel to the destination for other reasons (e.g. due to business travel or attractiveness), this would lead to an upward biased estimate of $(1 - \sigma_T)$ (towards zero).

The first thing we do to address this concern is to include a basic control for time changing economic conditions in the destination countries, by including the log of country GDP as a control. Second, to address remaining concerns, in addition to the very likely concern of measurement error in our measure of $ln\, w_{nt}$, we use nominal exchange rate changes across destination countries with respect to the US Dollar, $ln\, e_{nt}$, as an instrumental variable for $ln\,(1/PPP_{nt})$. The exchange rates are used as part of the PPP rate construction by the ICP, so that we can expect a strong first stage. The exclusion restriction is that differential exchange rate changes across different destination markets to not affect bilateral tourism expenditure except through relative price changes of tourism services. To further assess the validity of this assumption, we also estimate specification (30) after restricting attention to what we label touristic destinations: i.e. destinations for which more than 80 percent of total travel inflows are due to leisure rather than business travel. Finally, to allow for tourist flows to respond to relative price information across destination markets with some time lag, we also estimate specifications in which we lag the independent variable by 1-5 years.

Table 11 presents the estimation results. We find a moderately negative tourism elasticity that reaches $\sigma_T = 1.7$ when we lag the relative destination price changes by 3-4 year (1.5 with lesser lags). These results are confirmed with a slightly lower point estimate of 1.6 once we restrict attention to destinations with more than 80 of travel inflows driven by leisure rather than business purposes (even though we start to get problems with sparseness here). The preliminary conclusion we draw from these first estimations is that the tourism elasticity appears to be significantly lower than common estimates of the trade elasticity for flows in goods.

The upper-nest elasticity that governs the substitution patterns between manufacturing and tourism has to be smaller than the lower nest elasticity of $\sigma_T = 1.7$. We choose a value of $\rho = 1.5$

in our main specification. As for the trade elasticity for flows of goods, we use an existing estimate from the literature of $\theta = 6.1$ (Shapiro, 2014; Adao et al., 2015). As a robustness check, we also revisit our quantifications using a range of alternative parameter combinations of (σ_T, ρ, θ).

Armed with the calibrated values for $(w_n, L_{M,n}, L_{T,n}, L_{S,n}, D_n, \tau_{nm}, t_{nm})$ and estimates for the elasticities (θ, σ_T, ρ) presented above, we use numerical methods to recover the only (up to a normalization factor) vectors of local manufacturing productivities and local demand shifters for tourism (M_n, A_n), for $n \in \mathcal{M}$, that are consistent with the data.

5.2.3 Spatial Labor Supply Elasticity

In the second step of the analysis, we estimate the spatial labor supply elasticity. This elasticity was not needed to back out manufacturing productivities and local demand shifters for tourism (T_n, A_n), but is necessary to compute counterfactual equilibria and their welfare consequences. The estimating equation for the spatial labor supply elasticity is derived from Equation (10) of the model. It leads to the following estimating equation:

$$log\, L_n = K_o + \frac{1}{1-\kappa\epsilon} log\, B_n + \frac{\kappa}{1-\kappa\epsilon} log \left(\frac{w_n}{P_n}\right) + \nu_n \text{ for } n \in \mathcal{M} \tag{31}$$

where P_n is the local price index in region n and ν_n is a mean zero measurement error term. The Mincerized wages are observed in our data. Price indexes are not, but they are pinned down in the calibrated model. We use these to infer the vector of local real incomes, $\frac{w_n}{P_n}$.

Note that the "raw" spatial labor supply elasticity κ is not identified separately from the amentiy externality ϵ. For our purposes, and in particular for welfare computations, we do not need a separate estimate of these two elasticities, but only an estimate of $\frac{\kappa}{1-\kappa\epsilon}$. The main concern to causally identify $\frac{\kappa}{1-\kappa\epsilon}$ in specification (31) is that our measure of real wages is correlated with unobserved local amenities B_n. All else equal, this would lead to a downward bias (towards zero) in our estimate of the spatial labour supply elasticity. The second major concern is measurement error in our construction of local real wages across municipalities in 2000 and 2010. Both the Mincerized nominal wage measure and especially our construction of the local price indices using traded good and tourism market access measures are likely to be subject to measurement error.

To address these concerns, we exploit the identifying assumption that our measures of local beach quality only affect local employment through either their affect on nominal wages, or their affect on the local price index (both for tourism services and for traded goods). Notice that this empirical strategy also allows for tourism to affect local amenities, but only through its effect on local real wages and the resulting changes in local populations. This is captured as part of our reduced form labor supply elasticity, $\frac{\kappa}{1-\kappa\epsilon}$, where ϵ captures the change in local amenities due to changes in the local population density.

Table 12 presents the estimation results. We estimate large and significant positive point estimates for the expression $\frac{\kappa}{1-\kappa\epsilon}$. The point estimates for $\frac{\kappa}{1-\kappa\epsilon}$ is an order of magnitude larger in the IV specifications relative to the OLS specification. This is consistent with both downward bias due to unobserved local amenities as well as significant measurement error in our real wage measures. The IV point estimates suggest that the spatial labour supply elasticity across Mexican municipalities, $\frac{\kappa}{1-\kappa\epsilon}$, is about 10.2 for employment.

Finally, we further assess the potentially remaining concern that tourism may affect local amenities in B_n through direct channels that are not captured by its effect on the local population (through ϵ). For example, tourism could have either positive or negative direct effects on local amenities through its affect on the density of local restaurants and stores (positive), environmental degradation (negative) or congestion that is more intense per capita than in absence of tourism (negative). To further investigate these concerns, we are collecting data from several administrative sources aimed at capturing differences in positive or negative local amenities (work in progress).

5.2.4 Agglomeration Economies

Manufacturing is potentially subject to within and cross-sector production externalities. The development of tourism may have indirect effects on manufacturing production by affecting the scale of local production across different sectors. We have modelled that possibility in a reduced-form way by assuming that productivity in manufacturing may depend on the scale of local economic activity in manufacturing and services, through the productivity function:

$$M_n = M_n^o L_{M,n}^{\gamma_M} L_{ST,n}^{\gamma_S}.$$

Through the calibration of the baseline equilibrium, we recover a vector of local manufacturing productivities.[29] To fully characterize the effect of tourism on long-run economic outcomes, we need to estimate the within and cross-sector spillovers on manufacturing (γ_M, γ_S).

To do so, we propose a strategy based on indirect inference. We note that current-day populations are strongly correlated with the set of beach IVs that we have used in Section 3. At the same time, Table 5 establishes that these correlations were insignificant or marginally negative before the development of tourism in Mexico. This suggests a way to back out the productivity parameters using indirect inference. We develop a procedure that aims to match the results of the placebo regressions using a model-based counterfactual equilibrium where tourism frictions are assumed to be prohibitive.

We denote β_a as the coefficients of the regressions reported in Table 5, where a ranges from 1 to 6 and indexes the set of beach IVs used in our empirical strategy (where 1 is the island IV and 2-5 are the four beach IVs). Recall that the system of equations (16)-(26) allows us to compute numerically the distribution of wages and population in Mexico in a counterfactual equilibrium with prohibitive tourism frictions, assuming all other exogenous parameters remain unchanged. This procedure can be implemented for different combinations of the externality parameters (γ_M, γ_S). We write the resulting counterfactual vector of populations in Mexico as a function of the intensity of spillovers, of the level tourism frictions in the counterfactual equilibrium (t_{ij}^c), and of all other parameters of the model summarized by ξ^c. We assume that these parameters are exogenous and stay unchanged in the counterfactual equilibria we study, i.e. that $\xi^c = \xi^o$. The counterfactual

[29]The vector of productivities is pinned down up to a multiplicative constant.

population then becomes the function:

$$L_n^c = L_n^c(\gamma_M, \gamma_S, t_{ij}^c, \xi^c).$$

Having recovered this function of parameters (γ_M, γ_S), we use indirect inference to look for estimates $(\hat{\gamma_M}, \hat{\gamma_S})$ such that:

$$E\left[L_n^c(\hat{\gamma_M}, \hat{\gamma_S}, t_{ij}^c, \xi^c).z_a\right] = \widetilde{\beta}_a, \text{ for a=1..6},$$

where z_a is the a^{th} instrumental variable that we use in the reduced form analysis, and $\tilde{\beta_a}$ are the values we target in the procedure. They are related to the results of the placebo regressions presented in Table 5. We examine two specifications. In the first, we use $\tilde{\beta_a} = 0$ as the likely more conservative approach to estimate the extent of tourism spillovers. In the second specification, we use the actual point estimates of the regressions (which tend to be negative) as a target, i.e. $\tilde{\beta_a} = \beta_a$. In both cases, to find the best fitting parameters $(\hat{\gamma_M}, \hat{\gamma_S})$, we have to solve for a counterfactual equilibrium for each possible parameter combination. We then run the following regressions on the counterfactual population data, where outcomes in a counterfactual equilibrium are denoted with a superscript c:

$$log\, L_n^c = \alpha + \beta_a^c log\, z_a + \epsilon_a^c.$$

For each set of parameters $(\hat{\gamma_M}, \hat{\gamma_S})$, this yields an estimate of the regression coefficient β_a^C. We finally minimize the distance between β_a^C and $\tilde{\beta_a}$, by minimizing the loss function:

$$\mathcal{L}(\hat{\gamma_M}, \hat{\gamma_S}, t_{ij}^c, \xi^c) = \sum_a \left(\frac{\beta_a^c(\hat{\gamma_M}, \hat{\gamma_S}, t_{ij}^c, \xi^c) - \beta_a}{se_a^c} \right)^2,$$

where $se_a^c$is the standard error of the estimate β_a^c. This scaling ensures that the procedure weights each regression coefficient appropriately. Intuitively, imprecise estimates are weighted less in the minimization routine. Results of this procedure are reported graphically in Figure 3.[30] The best fitting combination of parameters over this grid to match the zero point estimates is $\widehat{\gamma_M} = .05$ and $\widehat{\gamma_S} = .16$. When the target is to match the actual point estimates of the regression, the best fitting combination of parameters is $\widehat{\gamma_M} = .075$ and $\widehat{\gamma_S} = .2$.

These results present evidence of sizable within and cross-sector spillover effects in Mexican manufacturing that rationalize the observed effects of tourism on regional manufacturing activity in Mexico. These findings underlie the strong observed effects of tourism development in Mexico on the reallocation of economic activity across space. The important remaining question is on the aggregate effect of these spillovers, to which we now turn in the aggregate welfare analysis.

[30]To minimize computing power requirements, we look for the parameter combination that delivers the best fit over a grid of possible values for γ_M and γ_S ranging from 0 to .25.

6 Quantification

This section proceeds to the quantification of the long-run economic consequences of tourism in Mexico. We first present our baseline results for the welfare gains from tourism, and decompose this effect into the underlying channels. We then report a number of additional quantification results to document the sensitivity across alternative parameter combinations. Finally, we analyze the distribution of the gains from tourism across different groups of the Mexican society.

6.1 Gains from Tourism

To evaluate the welfare gains brought about by the development of tourism in Mexico, we compare the level of welfare in a series of counterfactual equilibria to the one in the baseline current-day equilibrium. The counterfactual equilibria we consider are ones in which the extent of the development of tourism is limited compared to today's equilibrium. We examine two cases. In the first one, Mexico is closed to international tourism but within-country tourism is still possible. In the second one, tourism frictions are prohibitive both nationally and internationally. For each case, we conduct the analysis under the assumption that either $\widehat{\gamma_M} = .05$ and $\widehat{\gamma_S} = .16$, or that $\widehat{\gamma_M} = .075$ and $\widehat{\gamma_S} = .2$. The difference in aggregate welfare between a counterfactual equilibrium and the baseline equlibrium represents the welfare loss from going back to a world without tourism (resp. without international tourism). For the clarity of exposure, we refer to the inverse of these numbers as the 'gains from tourism'.

Table 13 presents the quantification of the gains from tourism. In the first column, we report the gains from tourism integration both domestically and internationally. In column 2, we limit the analysis to international tourism. The gains from the development of tourism amount to about 2.9% welfare gains per capita. The development of international tourism contributes to half of these gains, or 1.5%, in our preferred specification. Table 13 also decomposes these welfare results into the classical welfare gains, and those that come from spillover effects. Interestingly, while the spillovers lead to large regional reallocations of production in Mexico, their aggregate effect on Mexican welfare is largely muted. In the absence of spillovers, the welfare gains from tourism development would have amounted to 2.4%. This is reminiscent of the finding in (Kline & Moretti, 2014) that strong local agglomeration effects may be offset in the aggregate.

Note, however, that the result is not functional form driven but dictated by the data. To illustrate this point, we show below what would have happened with strong cross-sector spillovers of $\gamma_S = .15$ but no within-sector productivity externality in manufacturing ($\gamma_M = 0$). Conversely, we also study the case where within-sector externalities are high ($\gamma_M = 0.15$) but cross-sectoral spillovers are absent ($\gamma_S = 0$). Finally, we report the case without spillovers where the classical market integration effect is the only source of the gains from tourism.

Table 14 illustrates the impact that tourism would have had on regional outcomes for these different values of spillovers. Specifically, it reports the estimates of the following regressions:

$$\Delta logGDP_n = \beta_0^A + \beta_1^A logGDPTourism_n + X_n + \epsilon_n,$$

and

$$\Delta logGDPManu_n = \beta_0^M + \beta_1^M logGDPTourism_n + X_n + \epsilon_n,$$

where the local GDP for tourism is instrumented with the beach IV. We run these regressions for a range of parameter values for the cross and within-sector spillovers. In addition to the point estimates, Table 14 also reports what would have been the welfare gains from tourism integration in each case. Panel A corresponds to the outcomes of the first regression, on total local GDP, and Panel B corresponds to Manufacturing GDP only.

A first scenario that we explore is the one without any form of spillovers. In that case, tourism leads to the growth of local GDP (first column of Panel A), but this is only driven by the tourism sector. The effect of tourism on local manufacturing growth is negative (first column of Panel B), which would go against the reduced form empirical evidence presented in Section 3. This negative impact is driven by the classic Dutch disease mechanism: as local demand for tourism increases, it drives up wages which adversely affects local traded goods production. In turn, manufacturing locates in regions in which there is no upward pressure on wages coming from the development of tourism.

Another focal case is the situation in which we shut down any spillover going from tourism to manufacturing ($\gamma_S = 0$), but allow for agglomeration economies within manufacturing ('localization externalities') ($\gamma_M > 0$). The corresponding results are reported in the second column of both Panels. The development of tourism barely leads to an increase in local GDP (second column of Panel A), as it leads to a strong negative effect on local manufacturing growth (second column of Panel B). The underlying reason is that the Dutch disease effect described above is reinforced here by the presence of agglomeration externalities in manufacturing. Manufaturing and tourism do not coagglomerate. In terms of aggregate welfare, the existence of within-sector agglomeration economies in manufacturing in this case leads to a negative aggregate impact of the development of tourism: the welfare gains from tourism are reduced from 2.4% to 1% compared to what the classical gains from integration would have been in the absence of production externalities. This illustrates the case when tourism acts as a special case of the Dutch disease. Resources are reallocated away from traded goods production to tourism. Due to localization economies within manufacturing, this has negative implications for productivity in traded goods production - because agglomeration economies are present in manufacturing but absent in tourism-related services production.

The third column reports the polar opposite case where only cross-sector spillovers are at play. In that case, manufacturing GDP grows more in places in which tourism develops (third column of Panel B). This positive impact of the development of tourism on local manufacturing growth comes from a productivity effect: manufacturing becomes more productive where tourism develops. In turn, in the aggregate, this leads to additional welfare benefits of the developement of tourism, as it leads to a growth in manufacturing productivity that would not have otherwise occurred. Quantitatively, the welfare gains from tourism are in that case about 1.5 times higher than the classical gains from market integration without spillover effects.

These results are informative about the underlying channels of the gains from tourism that we estimate for the Mexican case ($\widehat{\gamma_M} = .075$ and $\widehat{\gamma_S} = .2$). Spillovers from tourism to manufacturing are strong enough to generate co-agglomeration patterns between touristic regions and manufacturing centers, as attested by the positive impact of tourism on local manufacturing growth. On the other hand, manufacturing is also estimated to be subject to within-sector agglomeration economies. While this effect tends to reinforce the observed coagglomeration pattern due to tourism, it also implies that the aggregate welfare effect of tourism on manufacturing productivity is muted. As we have seen above, the presence of positive own-sector spillovers pushes toward reducing the gains from tourism integration, whereas the presence of cross-industry spillovers has the opposite effect. They both work through the reallocation of workers from one sector to the other at the aggregate level across all Mexican regions. Here, both effects are at play and tend to offset one another in the aggregate. While these two agglomeration forces reinforce one another for the local effects of tourism on traded goods production and total GDP, the aggregate gains from tourism in Mexico are therefore largely comparable to what would have prevailed without spillovers (reported in columnn 1 of Table 14).

6.2 Robustness across Alternative Parameters

[Work in progress.]

6.3 Distribution of the Gains from Tourism

[Work in progress.]

7 Conclusion

Much of the existing social sciences literature on tourism and economic development has been critical about tourism's long run implications, especially in developing countries. At the same time, governments around the world, and to a lesser extent international aid organizations, are showing widespread interest in tourism and have committed substantial amounts of public funds for national and regional tourism promotion. Somewhat surprisingly in this context, both the existing literature and tourism policies are currently based on limited empirical evidence.

This paper combines a spatial equilibrium model of trade in goods and tourism services with a rich collection of Mexican microdata and a new empirical strategy in order to contribute to our understanding of the long term economic consequences of tourism in a developing country. To estimate the reduced form effects of differences in long term tourism exposure in today's cross-section of Mexican municipalities, we exploit oceanographic and geological variation in beach quality along the Mexican coastline and use high-resolution historical satellite data to construct a number of instrumental variables. To guide the estimation of tourism's welfare implications, we then write down a spatial equilibrium model, inform its calibration using the reduced form moments and explore general equilibrium counterfactuals.

The analysis gives rise to several new findings. We find that tourism causes large and significant increases in long run real economic activity across regions. Contrary to much of the existing literature, these local effects are driven by sizable multiplier effects on traded goods production. Through the lens of the model, these multiplier effects provide evidence of positive spillover effects of tourism on manufacturing production. In particular, we estimate significant cross-sector spillovers in addition to within-sector localization economies within manufacturing. Interestingly, while these two sources of agglomeration economies reinforce one another leading to large observed reallocations of manufacturing and total GDP towards tourism centers, we find that they largely offset one another for the aggregate implications of tourism. That is, while tourism leads to sizable gains in agglomeration economies at the local level, these gains are largely offset by reductions in agglomeration economies at the national level, so that the aggregate welfare gains from tourism are mainly driven by a classical market integration effect. Finally, we find that these gains from tourism are unevenly distributed across groups of gender, education and ethnicity in the Mexican society. Overall, we find that the gains from tourism are on average positive for all groups, but significantly regressive when taking into account the existing distribution of nominal incomes across these groups.

The analysis serves to inform currently ongoing policy debates in two central ways. First, we provide credible empirical evidence on the long term effects of tourism activity on economic outcomes both across Mexican regions and at the aggregate national level. Second, the methodology that we propose in this paper provides a useful empirical tool with wide applicability to study a number of open questions on the regional and aggregate effects of tourism or similar shocks in other empirical settings and for additional economic outcomes of interest.

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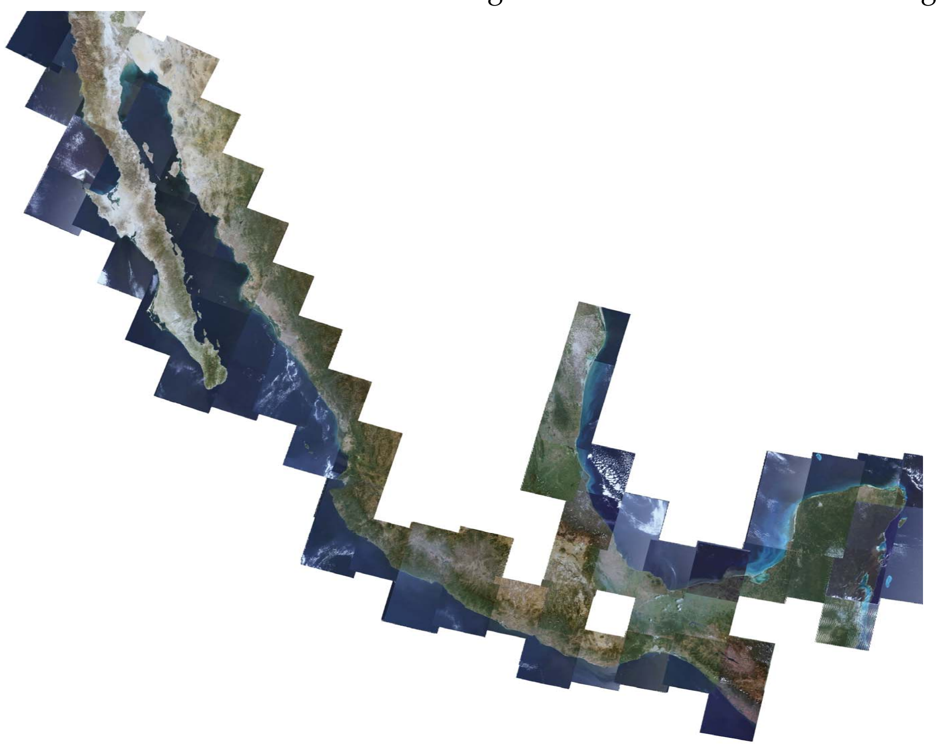
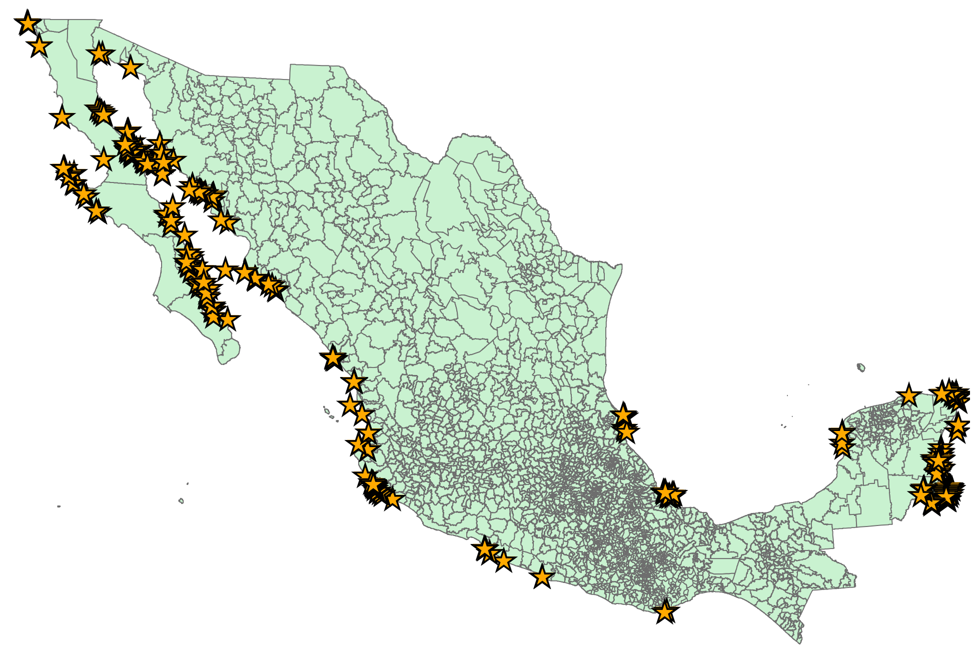
8 Figures and Tables

Figures

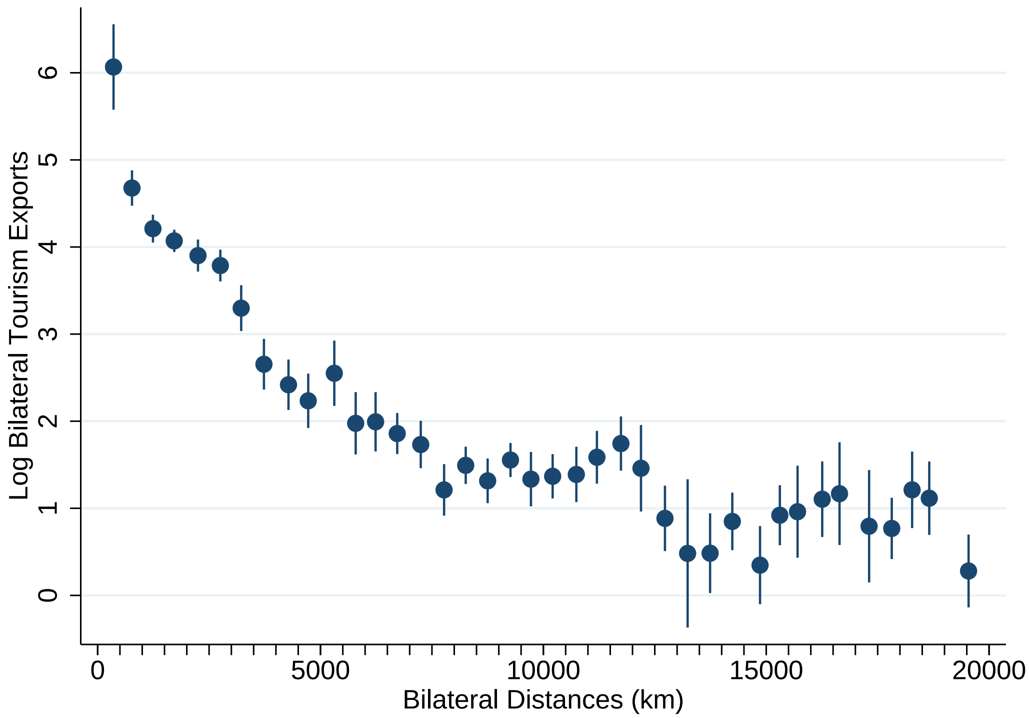
Figure 1: Beach Characteristics along the Mexican Coastline





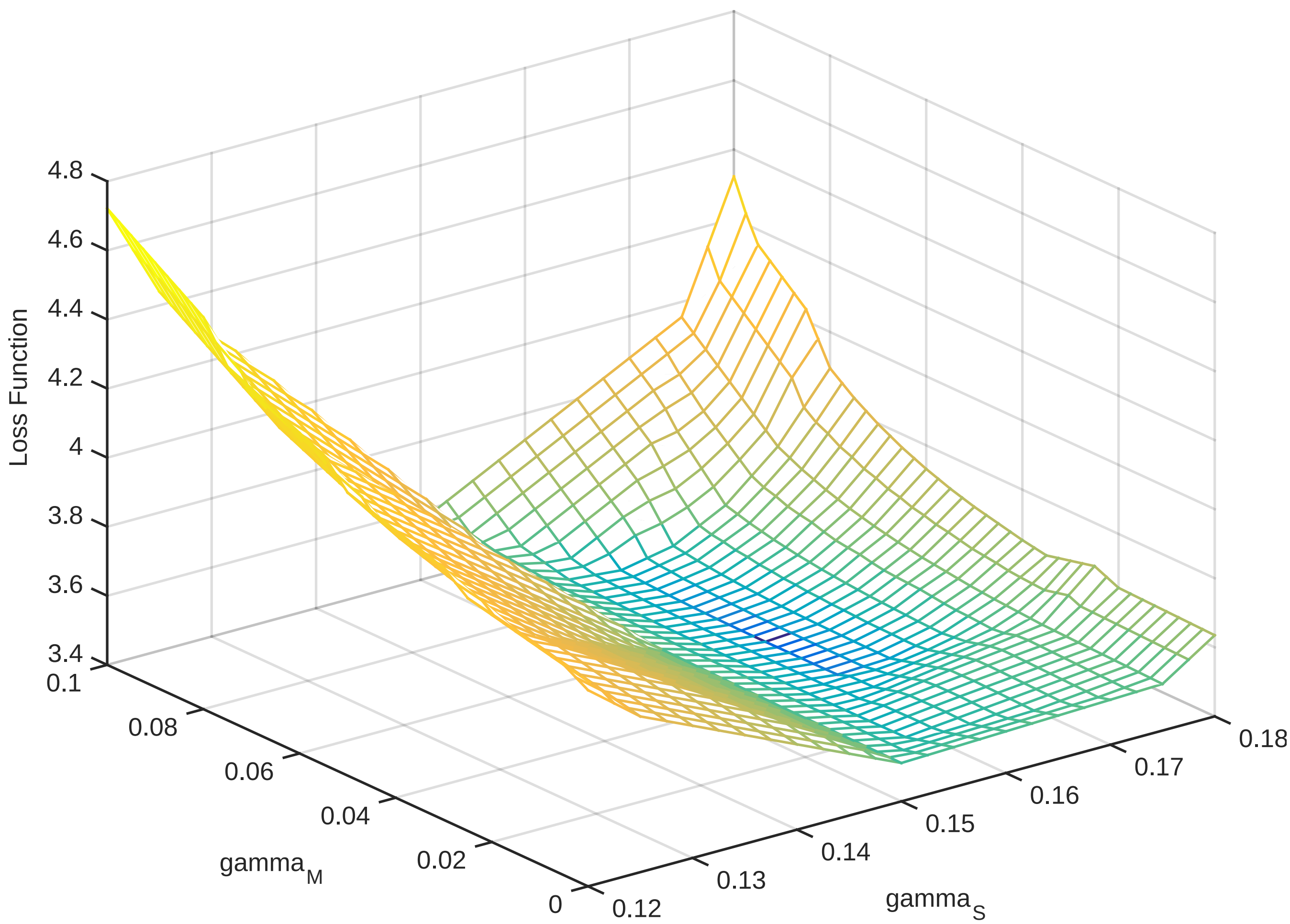
Notes: The figure on the left displays the remote sensing satellite data covering the Mexican coastline at a resolution of 30x30 meter. The figure on the right displays the location of islands within 5 kilometers from the Mexican coastline.

Figure 2: Tourism's Distance Decay



Notes: Point estimates from a regression of log tourism exports on 500 km bilateral distance bins in addition to origin-by-year fixed effects, destination-by-year fixed effects, and dummies for common border, language and colonial ties. The figure depicts 95% confidence intervals based on standard errors that are clustered at the level of origin-destination pairs.

Figure 3: Indirect Inference for Gammas



Tables

Table 1: Beach Tourism in Mexico

	Number of Municipalities	Sum of Hotel Revenues in 1998 and 2008 (Thousands of Pesos)	Share of National Hotel Revenues 1998 and 2008
Inland Municipalities	2305	46,070,000	0.365
Coastal Municipalities	150	80,130,000	0.635

Notes: The source are the Censos Economicos for 1998 and 2008.

Table 2: Descriptive Statistics

Data Source	Variable	1998 Censos Economicos or 2000 Population Census					2008 Censos Economicos or 2010 Population Census				
		N	mean	sd	min	max	N	mean	sd	min	max
Censos Economicos	state id	2,434	19.30	7.32	1.00	32.00	2,455	19.26	7.34	1.00	32.00
	gdp	2,434	1,528,000.00	9,613,000.00	6.00	251,800,000.00	2,455	4,480,000.00	27,220,000.00	21.00	704,200,000.00
	log gdp	2,434	9.92	2.97	1.79	19.34	2,455	10.92	2.96	3.05	20.37
	hotel sales	2,434	12,847.00	138,994.00	0.00	5,230,000.00	2,455	38,668.00	433,757.00	0.00	13,730,000.00
	log hotel sales	2,434	3.28	3.92	0.00	16.16	2,455	4.53	4.26	0.00	17.13
	number of hotels	2,434	4.42	18.53	0.00	431.00	2,455	7.51	26.72	0.00	457.00
Population Census	population	2,434	39,832.00	119,060.00	105.00	1,763,000.00	2,455	45,603.00	132,175.00	90.00	1,794,000.00
	log population	2,434	9.34	1.50	4.65	14.38	2,455	9.42	1.56	4.50	14.40
	employment	2,434	14,542.00	48,042.00	34.00	825,945.00	2,455	17,999.00	60,391.00	37.00	874,120.00
	log employment	2,434	8.17	1.56	3.53	13.62	2,455	8.27	1.64	3.61	13.68
Satellite Data and GIS	coast id	2,434	0.06	0.24	0.00	1.00	2,455	0.06	0.24	0.00	1.00
	island dummy	2,434	0.02	0.14	0.00	1.00	2,455	0.02	0.14	0.00	1.00
	beach type 1 share within 100 m of coast	2,434	0.00	0.00	0.00	0.08	2,455	0.00	0.00	0.00	0.08
	beach type 2 share within 100 m of coast	2,434	0.00	0.00	0.00	0.01	2,455	0.00	0.00	0.00	0.01
	beach type 3 share within 100 m of coast	2,434	0.00	0.00	0.00	0.06	2,455	0.00	0.00	0.00	0.06
	beach type 4 share within 100 m of coast	2,434	0.00	0.00	0.00	0.05	2,455	0.00	0.00	0.00	0.05
	beach types 1-4 share within 100 m of coast	2,434	0.00	0.00	0.00	0.09	2,455	0.00	0.00	0.00	0.09
	distance to northern border (km)	2,434	753.40	265.80	6.59	1,348.00	2,455	755.10	266.00	6.59	1,348.00
	distance to Mex City (km)	2,434	453.70	372.50	2.30	2,271.00	2,455	454.20	372.10	2.30	2,271.00
Mexican Statistical Institute (INEGI)	state capital dummy	2,434	0.02	0.14	0.00	1.00	2,455	0.02	0.14	0.00	1.00
	old city dummy	2,434	0.02	0.13	0.00	1.00	2,455	0.02	0.13	0.00	1.00
	colonial port dummy	2,434	0.00	0.03	0.00	1.00	2,455	0.00	0.03	0.00	1.00
	average temperature	2,434	197.30	40.30	104.50	290.30	2,455	197.40	40.36	104.50	290.30
	average percipitation	2,434	88.79	50.57	5.99	336.50	2,455	89.15	50.77	5.99	336.50

Table 3: Tourism's Effect on Municipality Employment and Population

Dependent variables:	Log Municipality Employment 2000, 2010								Log Municipality Population 2000, 2010	
	(1) OLS	(2) OLS	(3) Island IV	(4) Island IV	(5) Beach IV	(6) Beach IV	(7) Both IVs	(8) Both IVs	(9) Both IVs	(10) Both IVs
Log Hotel Sales	0.236***	0.218***	0.295***	0.323***	0.228**	0.243***	0.263***	0.275***	0.212***	0.221***
	(0.00605)	(0.00568)	(0.0890)	(0.122)	(0.0917)	(0.0888)	(0.0573)	(0.0643)	(0.0613)	(0.0686)
Log Distance to US Border	0.0790**	-0.0290	0.105**	0.0206	0.0754	-0.0171	0.0910**	-0.00217	0.138***	0.0444
	(0.0386)	(0.0416)	(0.0513)	(0.0676)	(0.0568)	(0.0588)	(0.0436)	(0.0486)	(0.0465)	(0.0514)
Log Distance to Mexico City	-0.587***	-0.578***	-0.508***	-0.463***	-0.598***	-0.550***	-0.551***	-0.516***	-0.595***	-0.568***
	(0.0258)	(0.0284)	(0.122)	(0.137)	(0.125)	(0.101)	(0.0810)	(0.0761)	(0.0862)	(0.0809)
Log Municipality Area	0.340***	0.351***	0.263**	0.223	0.350***	0.320***	0.305***	0.282***	0.364***	0.343***
	(0.0172)	(0.0169)	(0.118)	(0.150)	(0.121)	(0.110)	(0.0774)	(0.0810)	(0.0826)	(0.0863)
State Capital Dummy		0.796***		0.378		0.696*		0.570*		0.540*
		(0.191)		(0.506)		(0.398)		(0.304)		(0.328)
Old City Dummy		1.028***		0.624		0.931**		0.809**		0.836**
		(0.229)		(0.513)		(0.404)		(0.323)		(0.349)
Colonial Port Dummy		0.699***		0.300		0.603*		0.483*		0.589*
		(0.141)		(0.509)		(0.364)		(0.291)		(0.308)
Log Average Percipitation		0.263***		0.244***		0.258***		0.253***		0.241***
		(0.0402)		(0.0483)		(0.0431)		(0.0425)		(0.0428)
Log Average Temperature		0.233**		0.194		0.224**		0.212*		0.273**
		(0.106)		(0.123)		(0.111)		(0.111)		(0.108)
Year-By-Coast FX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	4,889	4,889	4,889	4,889	4,889	4,889	4,889	4,889	4,889	4,889
R-squared	0.659	0.682	0.642	0.635	0.658	0.679	0.655	0.668	0.642	0.660
Number of Municipalities	2455	2455	2455	2455	2455	2455	2455	2455	2455	2455
First Stage F-Stat			9.549	5.748	11.71	11.81	14.36	11.59	14.36	11.59
Over-ID Test P-Value							0.625	0.617	0.538	0.533

Notes: Island IV is a dummy indicating whether an offshore island is within 5 km of the municipalities coastline. Beach IV is the fraction of municipality area within 100 m of the coastline covered by white sand pixels that lie within the wavelength ranges of the top ranked Mexican beach. Log hotel sales are measured with the hyperbolic inverse sine transformation as described in Section 3. Standard errors are clustered at the level of municipalities. * 10%, ** 5%, *** 1% significance levels.

Table 4: Robustness

Dependent variable:	Log Municipality Employment 2000, 2010									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All Municipalities	Coastal Municipalities Only	Beach Type 1 (Baseline Spec)	Beach Type 1 Exclude Origin Municipality	Beach Type 2 Exclude Origin Municipality	Beach Type 3 Exclude Origin Municipality	Beach Type 4 Exclude Origin Municipality	All Beach Types Exclude Origin Municipalities	Beach Type 1 Island Within 10 km	Beach Type 1 Within 200 m of Shoreline
	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs
Log Hotel Sales	0.279***	0.279***	0.275***	0.279***	0.301***	0.324***	0.262***	0.334***	0.266***	0.282***
	(0.0511)	(0.0511)	(0.0643)	(0.0656)	(0.0660)	(0.0913)	(0.0576)	(0.127)	(0.0625)	(0.0601)
Log Distance to US Border			-0.00217	0.000375	0.0110	0.0216	-0.00873	0.0278	-0.00644	0.00103
			(0.0486)	(0.0490)	(0.0488)	(0.0569)	(0.0463)	(0.0716)	(0.0485)	(0.0473)
Log Distance to Mexico City			-0.516***	-0.511***	-0.486***	-0.461***	-0.530***	-0.450***	-0.526***	-0.509***
			(0.0761)	(0.0776)	(0.0784)	(0.105)	(0.0691)	(0.144)	(0.0742)	(0.0718)
Log Municipality Area			0.282***	0.277***	0.249***	0.221*	0.297***	0.210	0.293***	0.273***
			(0.0810)	(0.0826)	(0.0830)	(0.114)	(0.0723)	(0.156)	(0.0788)	(0.0759)
State Capital Dummy			0.570*	0.552*	0.462	0.371	0.622**	0.329	0.606**	0.543*
			(0.304)	(0.308)	(0.306)	(0.392)	(0.284)	(0.528)	(0.300)	(0.289)
Old City Dummy			0.809**	0.795**	0.708**	0.620	0.857***	0.586	0.844***	0.783**
			(0.323)	(0.325)	(0.322)	(0.402)	(0.308)	(0.522)	(0.320)	(0.308)
Colonial Port Dummy			0.483*	0.461	0.376	0.289	0.537**	0.236	0.517*	0.457
			(0.291)	(0.298)	(0.309)	(0.407)	(0.267)	(0.556)	(0.282)	(0.279)
Log Average Percipitation			0.253***	0.252***	0.249***	0.245***	0.255***	0.244***	0.254***	0.252***
			(0.0425)	(0.0426)	(0.0432)	(0.0458)	(0.0418)	(0.0486)	(0.0421)	(0.0424)
Log Average Temperature			0.212*	0.209*	0.201*	0.192	0.218**	0.186	0.215*	0.209*
			(0.111)	(0.111)	(0.114)	(0.119)	(0.110)	(0.127)	(0.110)	(0.111)
Year-By-Coast FX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	4,889	297	4,889	4,888	4,887	4,887	4,887	4,882	4,889	4,889
Number of Municipalities	2455	150	2455	2454	2454	2454	2454	2451	2455	2455
First Stage F-Stat	14.45	14.23	11.59	11.22	7.399	4.580	22.38	2.957	12.81	16.11
Over-ID Test P-Value	0.168	0.168	0.617	0.560	0.841	0.897	0.277	0.720	0.709	0.660

Notes: See Section 3 for discussion. Standard errors are clustered at the level of municipalities. * 10%, ** 5%, *** 1% significance levels.

Table 5: Placebo Falsification Tests

Dependent variable:	Log Municipality Census Population											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Census Years:	1921, 1930, 1940, 1950	2000, 2010	1921, 1930, 1940, 1950	2000, 2010	1921, 1930, 1940, 1950	2000, 2010	1921, 1930, 1940, 1950	2000, 2010	1921, 1930, 1940, 1950	2000, 2010	1921, 1930, 1940, 1950	2000, 2010
	Island IV	Island IV	Beach IV Type 1	Beach IV Type 1	Beach IV Type 2	Beach IV Type 2	Beach IV Type 3	Beach IV Type 3	Beach IV Type 4	Beach IV Type 4	Beach IV All Types	Beach IV All Types
Panel A: Inverse Hyperbolic Sine Transformation for Log Population												
Instrumental Variable	-0.151	0.510**	-34.12*	12.38	-236.3	138.2*	-34.60	16.16	-74.91	47.08***	-15.20	6.757*
	(0.350)	(0.233)	(19.26)	(9.327)	(241.9)	(81.59)	(29.52)	(13.19)	(66.70)	(16.49)	(9.522)	(3.979)
Log Distance to US Border	0.121*	0.0415	0.127**	0.0385	0.125**	0.0386	0.124*	0.0390	0.127**	0.0370	0.126**	0.0382
	(0.0636)	(0.0574)	(0.0634)	(0.0578)	(0.0635)	(0.0578)	(0.0635)	(0.0578)	(0.0635)	(0.0578)	(0.0634)	(0.0578)
Log Distance to Mexico City	-0.419***	-0.878***	-0.412***	-0.880***	-0.415***	-0.880***	-0.414***	-0.880***	-0.415***	-0.880***	-0.413***	-0.880***
	(0.0574)	(0.0321)	(0.0574)	(0.0322)	(0.0574)	(0.0322)	(0.0575)	(0.0322)	(0.0573)	(0.0321)	(0.0574)	(0.0322)
Log Municipality Area	0.497***	0.633***	0.494***	0.637***	0.495***	0.637***	0.494***	0.637***	0.497***	0.636***	0.494***	0.637***
	(0.0215)	(0.0205)	(0.0215)	(0.0205)	(0.0215)	(0.0204)	(0.0215)	(0.0205)	(0.0214)	(0.0204)	(0.0215)	(0.0204)
Year-By-Coast FX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	9,736	4,868	9,736	4,868	9,736	4,868	9,736	4,868	9,736	4,868	9,736	4,868
R-Squared	0.231	0.400	0.235	0.399	0.232	0.399	0.233	0.399	0.234	0.400	0.234	0.399
Number of Municipalities	2434	2434	2434	2434	2434	2434	2434	2434	2434	2434	2434	2434
Panel B: Log (1) for Zero Population												
Instrumental Variable	-0.144	0.510**	-33.79*	12.38	-234.1	138.2*	-34.73	16.16	-74.31	47.08***	-15.12	6.757*
	(0.337)	(0.233)	(19.08)	(9.327)	(240.2)	(81.59)	(29.50)	(13.19)	(66.16)	(16.49)	(9.478)	(3.979)
Log Distance to US Border	0.116*	0.0415	0.121**	0.0385	0.119**	0.0386	0.119**	0.0390	0.121**	0.0370	0.121**	0.0382
	(0.0607)	(0.0574)	(0.0605)	(0.0578)	(0.0605)	(0.0578)	(0.0606)	(0.0578)	(0.0605)	(0.0578)	(0.0605)	(0.0578)
Log Distance to Mexico City	-0.427***	-0.878***	-0.420***	-0.880***	-0.423***	-0.880***	-0.423***	-0.880***	-0.424***	-0.880***	-0.421***	-0.880***
	(0.0542)	(0.0321)	(0.0542)	(0.0322)	(0.0542)	(0.0322)	(0.0543)	(0.0322)	(0.0541)	(0.0321)	(0.0542)	(0.0322)
Log Municipality Area	0.499***	0.633***	0.495***	0.637***	0.496***	0.637***	0.496***	0.637***	0.498***	0.636***	0.496***	0.637***
	(0.0205)	(0.0205)	(0.0206)	(0.0205)	(0.0206)	(0.0204)	(0.0206)	(0.0205)	(0.0204)	(0.0204)	(0.0205)	(0.0204)
Year-By-Coast FX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	9,736	4,868	9,736	4,868	9,736	4,868	9,736	4,868	9,736	4,868	9,736	4,868
R-Squared	0.246	0.400	0.251	0.399	0.248	0.399	0.249	0.399	0.250	0.400	0.250	0.399
Number of Municipalities	2434	2434	2434	2434	2434	2434	2434	2434	2434	2434	2434	2434
Panel C: Ignore Municipalities with Zero Populations in the Past												
Instrumental Variable	-0.0483	0.555**	-26.81	11.45	-178.5	129.8	-34.96	15.62	-60.95	45.29***	-12.85	6.372
	(0.250)	(0.242)	(19.00)	(9.835)	(224.9)	(83.58)	(29.50)	(13.25)	(59.31)	(16.38)	(9.494)	(4.130)
Log Distance to US Border	0.0404	0.0572	0.0439	0.0557	0.0424	0.0557	0.0433	0.0559	0.0445	0.0542	0.0441	0.0553
	(0.0353)	(0.0600)	(0.0350)	(0.0604)	(0.0351)	(0.0604)	(0.0350)	(0.0604)	(0.0350)	(0.0604)	(0.0350)	(0.0604)
Log Distance to Mexico City	-0.541***	-0.864***	-0.536***	-0.865***	-0.538***	-0.865***	-0.536***	-0.865***	-0.539***	-0.865***	-0.536***	-0.865***
	(0.0258)	(0.0331)	(0.0257)	(0.0332)	(0.0257)	(0.0332)	(0.0257)	(0.0332)	(0.0256)	(0.0331)	(0.0257)	(0.0332)
Log Municipality Area	0.523***	0.636***	0.521***	0.640***	0.522***	0.640***	0.521***	0.640***	0.523***	0.639***	0.521***	0.640***
	(0.0130)	(0.0210)	(0.0132)	(0.0210)	(0.0132)	(0.0210)	(0.0132)	(0.0210)	(0.0131)	(0.0209)	(0.0132)	(0.0210)
Year-By-Coast FX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	9,548	4,774	9,548	4,774	9,548	4,774	9,548	4,774	9,548	4,774	9,548	4,774
R-Squared	0.432	0.397	0.437	0.396	0.434	0.396	0.436	0.396	0.436	0.396	0.437	0.396
Number of Municipalities	2387	2387	2387	2387	2387	2387	2387	2387	2387	2387	2387	2387

Notes: See Section 3 for discussion. Standard errors are clustered at the level of municipalities. * 10%, ** 5%, *** 1% significance levels.

Table 6: Model-Based Test of Direct Effect on Local Amenities

Dependent variable:	Log Municipality Amenities in 2010					
	(1)	(2)	(3)	(4)	(5)	(6)
	Not Using Island IV	Not Using Beach IV 1	Not Using Beach IV 2	Not Using Beach IV 3	Not Using Beach IV 4	Not Using Beach IV 5
Left -Out IV	0.268	-1.706	30.42	2.380	-6.510	-0.298
	(0.368)	(5.863)	(61.08)	(7.892)	(9.324)	(2.674)
Log Distance to US Border	0.149	0.234	0.227	0.228	0.234*	0.232
	(0.116)	(0.141)	(0.141)	(0.141)	(0.137)	(0.141)
Log Distance to Mexico City	-0.00401	0.0190	0.00890	0.0111	0.0184	0.0162
	(0.128)	(0.140)	(0.141)	(0.141)	(0.137)	(0.140)
Log Municipality Area	0.211**	0.198**	0.204**	0.203**	0.201**	0.200**
	(0.0811)	(0.0802)	(0.0846)	(0.0827)	(0.0790)	(0.0810)
State Capital Dummy	0.920***	0.847**	0.845**	0.844**	0.847**	0.846**
	(0.323)	(0.356)	(0.358)	(0.357)	(0.356)	(0.356)
Old City Dummy	-0.625	-0.742	-0.752	-0.749	-0.742	-0.744
	(0.517)	(0.579)	(0.583)	(0.582)	(0.577)	(0.580)
Colonial Port Dummy	3.007***	3.254***	3.264***	3.261***	3.258***	3.256***
	(0.455)	(0.358)	(0.361)	(0.360)	(0.352)	(0.358)
Log Average Percipitation	0.634**	0.679**	0.684**	0.683**	0.682**	0.680**
	(0.259)	(0.293)	(0.298)	(0.297)	(0.293)	(0.294)
Log Average Temperature	0.554	0.752	0.766	0.763	0.747	0.756
	(0.821)	(0.868)	(0.867)	(0.867)	(0.871)	(0.868)
Coast FX	✓	✓	✓	✓	✓	✓
Observations	300	300	300	300	300	300
R-Squared	0.531	0.491	0.491	0.491	0.491	0.491
Number of Clusters	32	32	32	32	32	32

Notes: See Section 3 for discussion. Standard errors are clustered at the level of Mexican states. * 10%, ** 5%, *** 1% significance levels.

Table 7: Tourism's Effect on Municipality Employment by Group

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	Log Employment by Group 2000, 2010							
Gender	Male	Male	Male	Male	Female	Female	Female	Female
Education	Skilled	Skilled	Unskilled	Unskilled	Skilled	Skilled	Unskilled	Unskilled
Ethnicity	Hispanic	Indigenous	Hispanic	Indigenous	Hispanic	Indigenous	Hispanic	Indigenous
Specification	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs
Log Hotel Sales	0.296***	0.710***	0.0796	0.616***	0.349***	0.660***	0.153*	0.605***
	(0.0739)	(0.197)	(0.0845)	(0.204)	(0.0771)	(0.186)	(0.0878)	(0.190)
Log Distance to US Border	-0.223***	0.438***	-0.111*	0.675***	-0.152**	0.463***	0.0530	0.647***
	(0.0578)	(0.129)	(0.0666)	(0.132)	(0.0593)	(0.125)	(0.0694)	(0.125)
Log Distance to Mexico City	-0.954***	0.513**	-1.153***	0.563**	-0.901***	0.529**	-1.128***	0.514**
	(0.0892)	(0.227)	(0.102)	(0.235)	(0.0922)	(0.214)	(0.104)	(0.220)
Log Municipality Area	0.407***	-0.649***	0.761***	-0.552**	0.330***	-0.650***	0.567***	-0.656***
	(0.0933)	(0.244)	(0.106)	(0.253)	(0.0975)	(0.231)	(0.110)	(0.236)
State Capital Dummy	0.705*	-0.200	0.520	-0.420	0.782**	0.229	0.669	0.0478
	(0.370)	(0.902)	(0.457)	(0.948)	(0.379)	(0.855)	(0.467)	(0.893)
Old City Dummy	0.773**	-0.533	1.145**	-0.514	0.663*	-0.202	1.112**	-0.103
	(0.379)	(0.926)	(0.478)	(0.979)	(0.387)	(0.865)	(0.493)	(0.918)
Colonial Port Dummy	0.720*	-1.790**	1.067***	-1.971**	0.788*	-0.967	1.255***	-1.128
	(0.391)	(0.844)	(0.405)	(0.871)	(0.435)	(0.805)	(0.399)	(0.864)
Log Average Percipitation	-0.515***	1.473***	-0.500***	1.954***	-0.605***	1.182***	-0.708***	1.572***
	(0.0674)	(0.128)	(0.0819)	(0.135)	(0.0644)	(0.122)	(0.0790)	(0.130)
Log Average Temperature	1.094***	0.00335	1.051***	-0.176	0.947***	-0.133	0.949***	-0.408
	(0.158)	(0.310)	(0.193)	(0.322)	(0.152)	(0.294)	(0.180)	(0.314)
Year-By-Coast FX	✓	✓	✓	✓	✓	✓	✓	✓
Observations	4,889	4,889	4,889	4,889	4,889	4,889	4,889	4,889
Number of Municipalities	2455	2455	2455	2455	2455	2455	2455	2455
First Stage F-Stat	11.59	11.59	11.59	11.59	11.59	11.59	11.59	11.59
Over-ID Test P-Value	0.176	0.566	0.0593	0.504	0.350	0.509	0.213	0.611

Notes: See Section 3 for discussion. Standard errors are clustered at the level of municipalities. * 10%, ** 5%, *** 1% significance levels.

Table 8: Tourism's Effect on Municipality Wage Bill and GDP

	Censos Economicos 1998, 2008											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variables:	Log Labor Income	Log Labor Income	Log GDP	Log GDP	Log GDP (w/o Hotel)	Log GDP (w/o Hotel)	Log GDP (Services)	Log GDP (Services)	Log GDP (Manu)	Log GDP (Manu)	Log GDP (Agri)	Log GDP (Agri)
	OLS	Both IVs	OLS	Both IVs	OLS	Both IVs	OLS	Both IVs	OLS	Both IVs	OLS	Both IVs
Log Hotel Sales	0.480***	0.477***	0.464***	0.425***	0.458***	0.392***	0.451***	0.551***	0.516***	0.273*	0.291***	0.195
	(0.0104)	(0.0966)	(0.0104)	(0.0932)	(0.0106)	(0.0979)	(0.00886)	(0.0795)	(0.0144)	(0.147)	(0.0164)	(0.156)
Log Distance to US Border	-0.364***	-0.366***	-0.299***	-0.317***	-0.304***	-0.336***	-0.188***	-0.141**	-0.290***	-0.405***	0.267**	0.222*
	(0.0713)	(0.0808)	(0.0691)	(0.0814)	(0.0696)	(0.0837)	(0.0577)	(0.0665)	(0.105)	(0.132)	(0.107)	(0.132)
Log Distance to Mexico City	-0.641***	-0.645***	-0.705***	-0.747***	-0.711***	-0.783***	-0.629***	-0.520***	-0.871***	-1.137***	-0.231***	-0.336*
	(0.0510)	(0.111)	(0.0489)	(0.112)	(0.0494)	(0.117)	(0.0423)	(0.0954)	(0.0678)	(0.176)	(0.0753)	(0.185)
Log Municipality Area	0.183***	0.188	0.217***	0.264**	0.221***	0.302**	0.237***	0.115	0.181***	0.478***	0.451***	0.569***
	(0.0323)	(0.121)	(0.0310)	(0.118)	(0.0313)	(0.124)	(0.0257)	(0.101)	(0.0430)	(0.186)	(0.0435)	(0.193)
State Capital Dummy	1.224***	1.240***	1.164***	1.317***	1.197***	1.461***	1.583***	1.185***	0.689**	1.659**	0.287	0.671
	(0.207)	(0.434)	(0.210)	(0.431)	(0.214)	(0.456)	(0.183)	(0.352)	(0.319)	(0.711)	(0.661)	(0.955)
Old City Dummy	1.310***	1.325***	1.307***	1.454***	1.324***	1.579***	1.328***	0.943***	1.242***	2.179***	0.733	1.104
	(0.240)	(0.442)	(0.242)	(0.447)	(0.246)	(0.474)	(0.220)	(0.352)	(0.363)	(0.751)	(0.809)	(1.041)
Colonial Port Dummy	0.829**	0.843*	0.548	0.693	0.551	0.803	0.973***	0.593	0.400	1.326	-0.873	-0.507
	(0.325)	(0.477)	(0.446)	(0.512)	(0.486)	(0.530)	(0.291)	(0.508)	(0.959)	(0.832)	(0.739)	(1.072)
Log Average Percipitation	-0.629***	-0.628***	-0.578***	-0.571***	-0.577***	-0.566***	-0.395***	-0.412***	-0.960***	-0.917***	-0.182	-0.165
	(0.0807)	(0.0839)	(0.0760)	(0.0787)	(0.0765)	(0.0802)	(0.0637)	(0.0653)	(0.106)	(0.118)	(0.111)	(0.114)
Log Average Temperature	0.577***	0.578***	1.069***	1.083***	1.077***	1.102***	1.114***	1.077***	1.394***	1.486***	2.367***	2.403***
	(0.197)	(0.197)	(0.184)	(0.187)	(0.186)	(0.191)	(0.156)	(0.162)	(0.270)	(0.291)	(0.305)	(0.314)
Year-By-Coast FX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	4,596	4,596	4,889	4,889	4,889	4,889	4,889	4,889	4,889	4,889	4,889	4,889
R-squared	0.636	0.636	0.643	0.641	0.636	0.631	0.711	0.697	0.506	0.457	0.429	0.422
Number of Municipalities	2385	2385	2455	2455	2455	2455	2455	2455	2455	2455	2455	2455
First Stage F-Stat		11.27		11.59		11.59		11.59		11.59		11.59
Over-ID Test P-Value		0.380		0.107		0.140		0.718		0.137		0.214

Notes: See Section 3 for discussion. Standard errors are clustered at the level of municipalities. * 10%, ** 5%, *** 1% significance levels.

Table 9: Tourism's Effect on Local GDP Net of Government Investment

	Censos Economicos 1998, 2008				
	(1)	(2)	(3)	(4)	(5)
Dependent Variables:	Log GDP	Log GDP Excluding FONATUR	Log GDP Net of Transfers (Fiscal Multiplier = 1)	Log GDP Net of Transfers (Fiscal Multiplier = 2)	Log GDP Net of Transfers (Fiscal Multiplier = 3)
	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs
Log Hotel Sales	0.425***	0.383***	0.425***	0.415***	0.404***
	(0.0932)	(0.120)	(0.0967)	(0.105)	(0.118)
Log Distance to US Border	-0.317***	-0.336***	-0.390***	-0.461***	-0.467***
	(0.0814)	(0.0911)	(0.0970)	(0.101)	(0.105)
Log Distance to Mexico City	-0.747***	-0.794***	-0.698***	-0.629***	-0.560***
	(0.112)	(0.139)	(0.120)	(0.126)	(0.140)
Log Municipality Area	0.264**	0.315**	0.195	0.137	0.0716
	(0.118)	(0.149)	(0.125)	(0.131)	(0.143)
State Capital Dummy	1.317***	1.483***	1.572***	1.630***	1.679***
	(0.431)	(0.540)	(0.463)	(0.476)	(0.507)
Old City Dummy	1.454***	1.618***	1.746***	1.675***	1.591***
	(0.447)	(0.543)	(0.522)	(0.540)	(0.576)
Colonial Port Dummy	0.693	0.848	0.711*	0.845**	1.104***
	(0.512)	(0.567)	(0.390)	(0.389)	(0.414)
Log Average Percipitation	-0.571***	-0.569***	-0.621***	-0.498***	-0.529***
	(0.0787)	(0.0816)	(0.104)	(0.119)	(0.122)
Log Average Temperature	1.083***	1.102***	0.720***	0.390	0.139
	(0.187)	(0.192)	(0.221)	(0.239)	(0.254)
Year-By-Coast FX	✓	✓	✓	✓	✓
Observations	4,889	4,879	4,008	3,370	2,947
Number of Municipalities	2455	2450	2173	1887	1676
First Stage F-Stat	11.59	5.810	12.30	11.15	10.14
Over-ID Test P-Value	0.107	0.331	0.109	0.173	0.250

Notes: See Section 3 for discussion. Standard errors are clustered at the level of municipalities. * 10%, ** 5%, *** 1% significance levels.

Table 10: Tourism’s Effect on Municipality Wages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variables:	Average Log Wage Residuals 2000, 2010		Log Wage Residuals by Group 2000, 2010							
Gender			Male	Male	Male	Male	Female	Female	Female	Female
Education			Skilled	Skilled	Unskilled	Unskilled	Skilled	Skilled	Unskilled	Unskilled
Ethnicity			Hispanic	Indigenous	Hispanic	Indigenous	Hispanic	Indigenous	Hispanic	Indigenous
Specification	OLS	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs	Both IVs
Log Hotel Sales	0.0126***	0.0333***	0.0311***	-0.0199	0.0493***	0.00664	0.0248**	-0.0147	0.0505***	0.0508***
	(0.00114)	(0.0108)	(0.0113)	(0.0249)	(0.0132)	(0.0269)	(0.0120)	(0.0255)	(0.0116)	(0.0177)
Log Distance to US Border	-0.0970***	-0.0872***	-0.0625***	-0.0603**	-0.0726***	-0.101***	-0.0773***	-0.0641*	-0.151***	-0.148***
	(0.00661)	(0.00893)	(0.00909)	(0.0255)	(0.0108)	(0.0250)	(0.00929)	(0.0339)	(0.0123)	(0.0304)
Log Distance to Mexico City	0.00235	0.0251*	0.0546***	-0.0289	0.0279*	-0.0672**	0.0604***	-0.00802	-0.00524	-0.0468*
	(0.00564)	(0.0130)	(0.0134)	(0.0306)	(0.0156)	(0.0322)	(0.0143)	(0.0330)	(0.0144)	(0.0245)
Log Municipality Area	0.00955***	-0.0159	-0.0195	0.0589*	-0.0308*	0.0392	-0.0238	0.0551*	-0.0164	-0.0114
	(0.00368)	(0.0137)	(0.0145)	(0.0315)	(0.0169)	(0.0329)	(0.0153)	(0.0325)	(0.0152)	(0.0232)
State Capital Dummy	0.0519**	-0.0312	-0.0189	0.139	-0.0658	0.0866	0.0131	0.0364	-0.0612	-0.0311
	(0.0221)	(0.0534)	(0.0575)	(0.107)	(0.0635)	(0.115)	(0.0595)	(0.108)	(0.0565)	(0.0880)
Old City Dummy	0.0435	-0.0367	-0.0218	0.0983	-0.113*	-0.0383	-0.00502	0.127	-0.0719	-0.0685
	(0.0271)	(0.0562)	(0.0610)	(0.104)	(0.0652)	(0.111)	(0.0633)	(0.107)	(0.0622)	(0.0866)
Colonial Port Dummy	-0.0977***	-0.177**	-0.125	0.0232	-0.187**	-0.0400	-0.131**	-0.117	-0.197***	-0.127
	(0.0320)	(0.0707)	(0.0842)	(0.111)	(0.0816)	(0.123)	(0.0569)	(0.144)	(0.0695)	(0.182)
Log Average Percipitation	-0.0640***	-0.0677***	-0.0660***	-0.104***	-0.126***	-0.205***	0.0181	-0.00447	-0.0859***	-0.127***
	(0.00985)	(0.0105)	(0.0118)	(0.0186)	(0.0128)	(0.0191)	(0.0124)	(0.0248)	(0.0155)	(0.0233)
Log Average Temperature	0.0160	0.00815	-0.0848***	-0.169***	0.0411	0.0400	-0.0869***	-0.228***	0.0504	-0.00408
	(0.0266)	(0.0282)	(0.0291)	(0.0548)	(0.0322)	(0.0534)	(0.0294)	(0.0679)	(0.0390)	(0.0674)
Year-By-Coast FX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	4,889	4,889	4,802	3,895	4,758	4,153	4,774	3,102	4,645	3,407
Number of Municipalities	2455	2455	2448	2209	2426	2282	2445	1858	2387	1957
First Stage F-Stat		11.59	11.64	9.933	11.69	11.07	11.69	8.485	11.86	9.953
Over-ID Test P-Value		0.305	0.0348	0.907	0.0758	0.529	0.108	0.185	0.686	0.627

Notes: See Section 3 for discussion. Standard errors are clustered at the level of municipalities. * 10%, ** 5%, *** 1% significance levels.

Table 11: Tourism's Trade Elasticity

Dependent Variables:	Log Tourism Exports from Origin to Destination						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Same Year	Same Year	1-Year Lag	2-Year Lag	3-Year Lag	4-Year Lag	5-Year Lag
	OLS	IV	IV	IV	IV	IV	IV
Panel A: All Destinations							
Log Inverse Consumption PPP	-0.140***	-0.201	-0.419*	-0.550**	-0.715**	-0.710**	-0.351
	(0.0402)	(0.205)	(0.227)	(0.222)	(0.281)	(0.301)	(0.227)
Log Destination GDP	0.438***	0.410***	0.238**	0.0699	-0.104	-0.102	0.0216
	(0.0492)	(0.103)	(0.121)	(0.121)	(0.152)	(0.165)	(0.129)
Origin-by-Destination FX	✓	✓	✓	✓	✓	✓	✓
Origin-by-Period FX	✓	✓	✓	✓	✓	✓	✓
Observations	25,089	25,089	20,935	18,328	16,084	14,361	12,497
Number of Orig-Dest Pairs	2899	2899	2596	2513	2265	2169	2098
First Stage F-Stat		171.5	159.9	136.4	72.74	76.19	102.5
Panel B: Touristic Destinations Only							
Log Inverse Consumption PPP	-0.114***	-0.298	-0.488**	-0.571**	-0.656**	-0.616*	-0.361
	(0.0442)	(0.204)	(0.249)	(0.251)	(0.311)	(0.339)	(0.293)
Log Destination GDP	0.402***	0.312***	0.132	-0.00375	-0.141	-0.159	-0.109
	(0.0631)	(0.110)	(0.138)	(0.137)	(0.162)	(0.182)	(0.162)
Origin-by-Destination FX	✓	✓	✓	✓	✓	✓	✓
Origin-by-Period FX	✓	✓	✓	✓	✓	✓	✓
Observations	17,165	17,165	14,294	12,535	11,052	9,874	8,603
Number of Orig-Dest Pairs	1981	1981	1771	1710	1511	1474	1428
First Stage F-Stat		138.0	119.4	125.4	62.48	65.19	69.67

Notes: See Section 5 for discussion. Standard errors are clustered at the level of origin-by-destination pairs. * 10%, ** 5%, *** 1% significance levels.

Table 12: The Spatial Labor Supply Elasticity in Mexico

Dependent Variable:	Log Municipality Employment 2000, 2010							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	Island IV & Beach IV 1	Island IV & Beach IV 4	All Six IVs	OLS	Island IV & Beach IV 1	Island IV & Beach IV 4	All Six IVs
Log Nominal Wage	1.459**	7.142	6.041**	5.461***				
	(0.539)	(4.686)	(2.417)	(2.016)				
Log Real Wage					2.842***	12.98	11.18**	10.23***
					(1.002)	(8.251)	(4.435)	(3.826)
Log Distance to US Border	-0.000176	0.336	0.271	0.237	0.00169	0.317	0.261	0.231
	(0.0975)	(0.357)	(0.222)	(0.198)	(0.0972)	(0.338)	(0.219)	(0.200)
Log Distance to Mexico City	-0.0642	-0.0949	-0.0890	-0.0858	-0.0365	0.0340	0.0214	0.0148
	(0.154)	(0.140)	(0.133)	(0.130)	(0.148)	(0.168)	(0.143)	(0.138)
Log Municipality Area	0.289***	0.148	0.175**	0.190**	0.291***	0.167	0.189**	0.201**
	(0.105)	(0.124)	(0.0843)	(0.0846)	(0.105)	(0.113)	(0.0825)	(0.0831)
State Capital Dummy	1.171***	0.773	0.850**	0.891**	1.154***	0.730	0.806*	0.845**
	(0.323)	(0.533)	(0.410)	(0.386)	(0.323)	(0.545)	(0.420)	(0.397)
Old City Dummy	-0.272	-0.898	-0.777	-0.713	-0.287	-0.916	-0.804	-0.745
	(0.514)	(0.696)	(0.588)	(0.566)	(0.516)	(0.695)	(0.593)	(0.573)
Colonial Port Dummy	3.086***	3.302***	3.260***	3.238***	3.093***	3.319***	3.278***	3.257***
	(0.319)	(0.382)	(0.354)	(0.341)	(0.320)	(0.379)	(0.353)	(0.341)
Log Average Percipitation	0.390*	0.794*	0.716**	0.675**	0.396*	0.787*	0.717**	0.681**
	(0.223)	(0.458)	(0.329)	(0.294)	(0.223)	(0.441)	(0.325)	(0.296)
Log Average Temperature	-0.181	1.044	0.807	0.682	-0.147	1.096	0.875	0.758
	(0.864)	(1.187)	(0.929)	(0.898)	(0.859)	(1.183)	(0.934)	(0.906)
Coast FX	✓	✓	✓	✓	✓	✓	✓	✓
Observations	300	300	300	300	300	300	300	300
Number of Clusters	32	32	32	32	32	32	32	32
First Stage F-Stat		1.685	33.55	32		1.804	34.94	31.77
Over-ID Test P-Value		0.679	0.570	0.538		0.661	0.578	0.542

Notes: See Section 5 for discussion. Standard errors are clustered at the level of Mexican states. * 10%, ** 5%, *** 1% significance levels.

Table 13: Quantification Results: The Gains from Tourism

Parameters	γ_s = 0.16 γ_m = 0.05	γ_s = 0.2 γ_m = 0.075	γ_s = 0 γ_m = 0
Gains from All Tourism	2.73	2.85	2.43
Gains from International Tourism	0.97	1.45	1.27

Notes: See Section 6 for discussion..

Table 14: Quantification Results: Alternative Parameter Scenarios

Dependent variable:	Counterfactual Change in Log Total GDP			Counterfactual Change in Log Manufacturing GDP		
	(1)	(2)	(3)	(4)	(5)	(6)
Parameters	γ_s = 0 γ_m = 0 Both IVs	γ_s = 0 γ_m = 0.15 Both IVs	γ_s = 0.15 γ_m = 0 Both IVs	γ_s = 0 γ_m = 0 Both IVs	γ_s = 0 γ_m = 0.15 Both IVs	γ_s = 0.15 γ_m = 0 Both IVs
Log Tourism GDP	0.123***	0.0229**	0.257***	-0.112***	-0.213***	0.0228***
	(0.0407)	(0.00890)	(0.0795)	(0.0362)	(0.0686)	(0.00534)
Log Distance to US Border	0.0577**	0.00855	0.117**	-0.0519**	-0.101**	0.00816
	(0.0257)	(0.00685)	(0.0502)	(0.0223)	(0.0421)	(0.00693)
Log Distance to Mexico City	-0.00638	-0.0448***	-0.0206	-0.0335	-0.0720	-0.0476***
	(0.0304)	(0.00749)	(0.0616)	(0.0286)	(0.0542)	(0.00683)
Log Municipality Area	-0.0732**	-0.0177**	-0.142**	0.0624**	0.118**	-0.00677
	(0.0327)	(0.00693)	(0.0659)	(0.0295)	(0.0558)	(0.00618)
State Capital Dummy	-0.247**	-0.0227	-0.488**	0.255***	0.480***	0.0123
	(0.103)	(0.0254)	(0.207)	(0.0900)	(0.171)	(0.0281)
Old City Dummy	-0.0317	0.0185	-0.0551	0.0545	0.105	0.0307
	(0.0911)	(0.0309)	(0.185)	(0.0744)	(0.140)	(0.0313)
Colonial Port Dummy	-0.299	-0.111**	-0.654	0.238	0.426	-0.119**
	(0.260)	(0.0450)	(0.534)	(0.234)	(0.453)	(0.0483)
Log Average Percipitation	-0.0589	-0.0225***	-0.106	0.0454	0.0819	-0.00171
	(0.0395)	(0.00860)	(0.0804)	(0.0367)	(0.0697)	(0.0105)
Log Average Temperature	-0.0489	-0.0354	-0.0687	0.0212	0.0349	0.00104
	(0.216)	(0.0451)	(0.423)	(0.198)	(0.372)	(0.0336)
Coast FX	✓	✓	✓	✓	✓	✓
Observations	300	300	300	300	300	300
Welfare Gains	**0.0243**	**0.0104**	**0.0322**	**0.0243**	**0.0104**	**0.0322**
Number of Clusters	32	32	32	32	32	32
First Stage F-Stat	83.84	83.84	83.84	83.84	83.84	83.84
Over-ID Test P-Val	0.412	0.230	0.422	0.481	0.478	0.620

Notes: See Section 6 for discussion. Standard errors are clustered at the level of Mexican states. * 10%, ** 5%, *** 1% significance levels.

Online Appendix

Appendix 1: Model

[Insert here.]

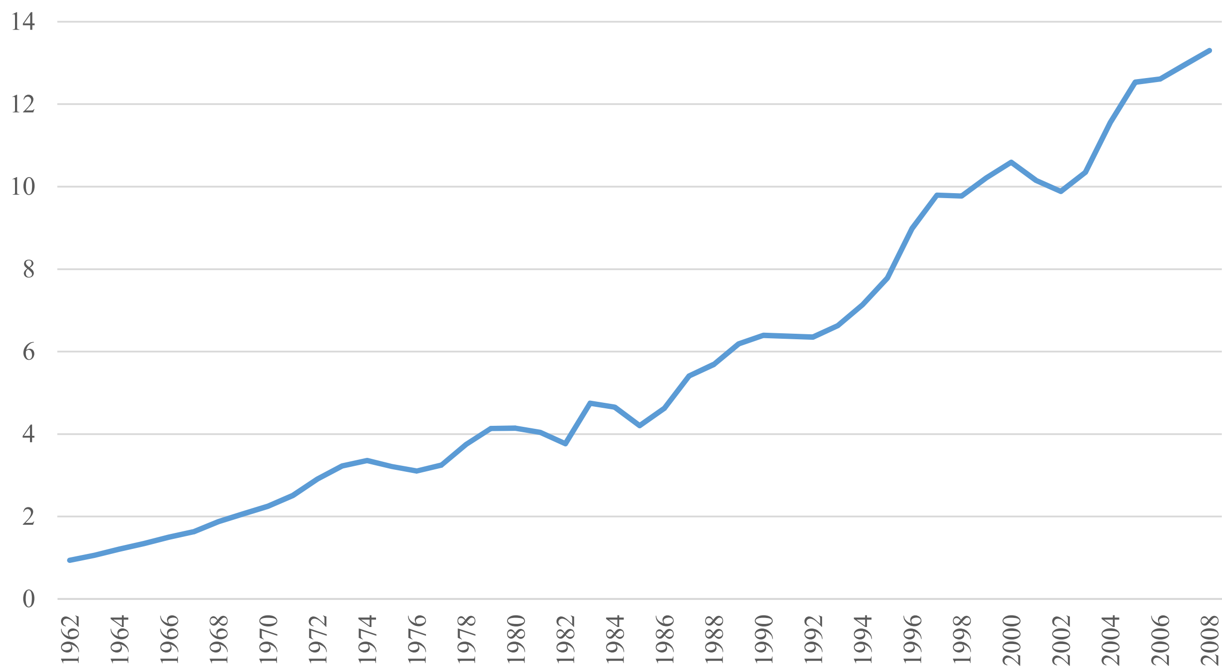
Appendix 2: Additional Figures and Tables

Table A.1: Acommodation Share in Total Mexican Tourism Expenditure 2003-2013

Year	Share of Accommodation in Total Tourism Expenditure
2003	0.130
2004	0.125
2005	0.126
2006	0.124
2007	0.126
2008	0.126
2009	0.125
2010	0.127
2011	0.127
2012	0.127
2013	0.129
Average 2003-13	0.127

Notes: The data source is the tourism satellite account of Mexico's national account statistics.

Figure A.1: Tourist Arrivals in Mexico (in Millions)



Notes: The data source is the Mexican Secretariat for Tourism (SECTUR). The depicted time series of arrivals refers to "interior tourists" and excludes so called "border tourists" that cross the border but do not move on to Mexico's interior. For example in 2008, Mexico reported a total of 23 million international tourists of which 13.5 million were interior tourists (depicted) and 9.5 million were border tourists.

Table A.2: Wavelength Ranges Among the Top Four Beaches in Mexico

Beaches	Bandwidth 1		Bandwidth 2		Bandwidth 3		Bandwidth 4		Bandwidth 5		Bandwidth 6	
	min	max	min	max	min	max	min	max	min	max	min	max
Playa del Carmen	72	125	67	110	79	120	119	175	69	142	41	93
Tulum	81	106	74	94	99	120	121	153	97	133	56	84
Cozumel	71	111	66	101	78	102	113	157	96	138	59	86
Cancun	81	111	72	101	74	102	38	149	15	125	7	71

Notes: The table presents the wavelength ranges of the top four beaches in Mexico a identified by U.S. News. The data source are LandSat satellite data from 1980s and 90s at a resolution of 30x30 meters.

Table A.3: Tourism's Effect on Municipality Employment and Population: Not Using IHS Transformation

Dependent variables:	Log Municipality Employment 2000, 2010			Log Municipality Population 2000, 2010		
	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline Specification (IHS Transformation) Both IVs	Log Hotel Sales (+1 for Zeroes) Both IVs	Log Hotel Sales (Ignore Zeroes) Both IVs	Baseline Specification (IHS Transformation) Both IVs	Log Hotel Sales (+1 for Zeroes) Both IVs	Log Hotel Sales (Ignore Zeroes) Both IVs
Log Hotel Sales	0.275***	0.279***	0.255***	0.221***	0.200**	0.225***
	(0.0643)	(0.0632)	(0.0763)	(0.0686)	(0.0859)	(0.0680)
Log Distance to US Border	-0.00217	-0.00742	0.0603	0.0444	0.0871	0.0403
	(0.0486)	(0.0470)	(0.0569)	(0.0514)	(0.0622)	(0.0502)
Log Distance to Mexico City	-0.516***	-0.537***	-0.452***	-0.568***	-0.487***	-0.584***
	(0.0761)	(0.0695)	(0.0510)	(0.0809)	(0.0566)	(0.0744)
Log Municipality Area	0.282***	0.308***	0.256***	0.343***	0.289***	0.364***
	(0.0810)	(0.0726)	(0.0338)	(0.0863)	(0.0376)	(0.0781)
State Capital Dummy	0.570*	0.568*	0.783***	0.540*	0.728**	0.538*
	(0.304)	(0.298)	(0.304)	(0.328)	(0.339)	(0.323)
Old City Dummy	0.809**	0.834***	0.980***	0.836**	0.947***	0.855**
	(0.323)	(0.313)	(0.290)	(0.349)	(0.320)	(0.340)
Colonial Port Dummy	0.483*	0.463	0.714**	0.589*	0.824**	0.572*
	(0.291)	(0.291)	(0.310)	(0.308)	(0.355)	(0.307)
Log Average Percipitation	0.253***	0.263***	0.104*	0.241***	0.0968*	0.249***
	(0.0425)	(0.0412)	(0.0536)	(0.0428)	(0.0564)	(0.0419)
Log Average Temperature	0.212*	0.213*	0.200	0.273**	0.220	0.275**
	(0.111)	(0.109)	(0.137)	(0.108)	(0.141)	(0.107)
Year-By-Coast FX	✓	✓	✓	✓	✓	✓
Observations	4,889	4,889	2,613	4,889	2,613	4,889
Number of Municipalities	2455	2455	1489	2455	1489	2455
First Stage F-Stat	11.59	12.09	16.95	11.59	16.95	12.09
Over-ID Test P-Value	0.617	0.642	0.528	0.533	0.485	0.550

Notes: See Section 3 for discussion. Standard errors are clustered at the level of municipalities. * 10%, ** 5%, *** 1% significance levels.

Table A.4: Tourism's Effect on Municipality Population: Using 100% Census Samples

Dependent variable:	Log Census Population 2000 and 2010			
	(1)	(2)	(3)	(4)
	10% Sample Data (IPUMS)		100% Sample Data (INEGI)	
	OLS	Both IVs	OLS	Both IVs
Log Hotel Sales	0.200***	0.221***	0.200***	0.223***
	(0.00564)	(0.0686)	(0.00563)	(0.0682)
Log Distance to US Border	0.0341	0.0444	0.0300	0.0410
	(0.0427)	(0.0514)	(0.0425)	(0.0511)
Log Distance to Mexico City	-0.592***	-0.568***	-0.590***	-0.565***
	(0.0284)	(0.0809)	(0.0283)	(0.0804)
Log Municipality Area	0.370***	0.343***	0.369***	0.341***
	(0.0171)	(0.0863)	(0.0170)	(0.0858)
State Capital Dummy	0.627***	0.540*	0.632***	0.540*
	(0.195)	(0.328)	(0.195)	(0.326)
Old City Dummy	0.920***	0.836**	0.920***	0.831**
	(0.233)	(0.349)	(0.233)	(0.347)
Colonial Port Dummy	0.672***	0.589*	0.673***	0.585*
	(0.143)	(0.308)	(0.143)	(0.306)
Log Average Percipitation	0.245***	0.241***	0.246***	0.242***
	(0.0407)	(0.0428)	(0.0407)	(0.0427)
Log Average Temperature	0.282***	0.273**	0.280***	0.271**
	(0.104)	(0.108)	(0.104)	(0.108)
Year-By-Coast FX	✓	✓	✓	✓
Observations	4,889	4,889	4,889	4,889
Number of Municipalities	2455	2455	2455	2455
First Stage F-Stat		11.59		11.59
Over-ID Test P-Value		0.533		0.525

Notes: See Section 3 for discussion. Standard errors are clustered at the level of municipalities. * 10%, ** 5%, *** 1% significance levels.