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Tourism, amenities, and welfare in an urban setting *

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Abstract

Using data on Italian cities, we document that, over the period 2001 – 2011, the number of establishments and employment in some key service industries are positively related to the inflow of tourists. We then build a general equilibrium model of small open cities to study the impact of tourism on endogenous amenities, factors' allocation across sectors, prices, and welfare. Tourism has two main effects on the urban economy: first, consistently with the observed pattern in the data, it increases the number of firms (an endogenous consumption amenity) and employment in the non-tradable sector; second, it increases prices. In the model tourism may hurt the resident population: with unequal land endowments, poorer residents are hurt by tourism because the rise in city prices offsets the positive impact on the urban consumption amenity. Along with several other extensions to the baseline model, we study the interplay of historical (exogenous) amenities, tourism and residents welfare in a system of two cities.

JEL Classification: R13; R31; R32; Z30; Z32.

Keywords: City; Consumption Amenities; Real Estate; Tourism; Welfare.

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Non-tecnical summary

In this paper, we provide a general framework to study the impact of tourism on a city. Tourism is a debated issue in many cities, especially in Europe: on the one hand, it is generally seen as beneficial for urban growth and development; on the other hand, as tourist inflows rise, cities are also experiencing rising rents and consumption prices, as well as increased congestion (such as noise, traffic, etc.).

As a motivation to our analysis, we document some empirical correlations using data on Italian cities, over the time period 2001 – 2011. We show that the number of restaurants and bars, as well as the number of retail stores, has increased more in municipalities that received a higher inflow of tourists. The same pattern holds for the level of employment in the same industries. These industries are closely related to urban consumption amenities, that are thought to be key for economic success (Glaeser *et al.*, 2008).

In our model, consumer's welfare depends on two components: consumption amenities and real income. Consumption amenities come in the form of product variety in the services sector. Furthermore, residents are at the same time wage earners on the labor market, land owners, and consumers. Tourism exerts an upward demand pressure on the land market, on the labor market, and on the market for services. Therefore, tourism has an impact both on consumption amenities and on the real income of residents.

Our analysis delivers a number of key findings. First, as tourist inflows rise, the share of residents employed in services increases. At high levels of tourism, cities fully specialize in the services sector. Second, we find that tourism always increases the *aggregate* welfare of residents. If land is equally distributed among residents, this also implies that tourism increases welfare for *all* residents. This outcome is the sum of two forces: first, consumption amenities increase; second, real incomes increase because of higher rents. As a third result, we find that, when land is unequally distributed, tourism harms poorer residents, unless consumption amenities are strong enough to compensate this effect.

Finally, we study the distribution of tourists between two alternative destinations. When consumption amenities are weak, tourists visit both cities in equilibrium. In this case, the share of tourists in a city is increasing with the level of historical amenities, services TFP, land stock, and resident population. When consumption amenities are strong, a "tourist hub" emerges, as the rich variety of services attracts all tourists in one of the two cities.

1 Introduction

Tourism is increasingly seen as one of the main drivers of urban growth and wealth. For instance, Carlino and Saiz (2008) show that the number of leisure visits to a city is one of the key predictors of its economic success. However, as tourist inflows rise, many cities are also experiencing rising land and consumption prices and congestion. Moreover, the costs and benefits of tourism may be shared unequally by the resident population, which is a key issue when evaluating the welfare impact of local policies aimed at boosting the tourism sector. In fact, these issues are currently being debated in many cities, especially in Europe; prominent examples include Venice and Barcelona, where concerns against rising rents and congestion led groups of residents to organize street protests and awareness campaigns.[1]

In this paper, we study how tourism affects cities through the lens of urban economics. Using data on Italian cities, we first document that, over the period 2001 – 2011, the number of establishments and the level of employment in services are positively related to the inflow of tourists. To address these patterns, we build a model with endogenous consumption amenities, price and real income effects, and two sectors of production (a tradable intermediate sector and a non-tradable services sector).

Consumption amenities come in the form of product variety in the services sector, where horizontally differentiated firms engage in monopolistic competition. These firms are retail shops, restaurants, and other economic activities connected to a thriving service sector. Real income effects arise because residents are at the same time wage earners, land owners and consumers, and wages, land prices and consumption prices are determined endogenously through market clearing. Tourism exerts an upward demand pressure on the land market, on the labour market, and on the market for the non-tradable good, inducing general equilibrium effects on all these variables.

Furthermore, when tourists are mobile across alternative destinations, spatial equilibrium effects arise. We characterize the spatial equilibrium in a simple Rosen-Roback setting

[1]Similar protests also occurred in Rome, Amsterdam, Dubrovnik - see, for instance, *First Venice and Barcelona: now anti-tourism marches spread across Europe*, (The Guardian, August 10th, 2017), and *How much tourism is too much?*, (The New York Times, June 29th, 2017).

with two cities. However, we depart from the classic framework (see Rosen, 1979; Roback, 1982) in that, in our model, the resident population is fixed, and there is a second class of agents, i.e. tourists, who are mobile across cities.[2]

Our paper addresses some important issues about the impact of tourism in an urban setting. The first concerns the way tourism changes the sectoral composition of the local economy. We find that, as the number of tourists increases, the city undergoes a structural transformation away from the tradable sector, and specializes in non-tradables - where, recall, the non-tradable sector is the source of consumption amenities. The pattern of urban specialization shapes the welfare impact of tourism on residents, and here we come to the second contribution of our analysis. We show that the aggregate welfare impact of tourism is always positive; however, in the partial specialization scenario which, as we show, is empirically more relevant we find that tourism has important distributional effects: our model predicts that poorer residents lose from increased tourism, whereas richer residents gain. Finally, as a third contribution, our analysis characterizes precisely the relationship between consumption amenities and the spatial equilibrium across cities. We show that when consumption amenities are strong, tourists are attracted to tourism-crowded cities, because as the number of tourists goes up and the service sector thrives, consumption amenities strengthen, and this, in turn, attracts even more tourists. In a system of two (or more) cities, this gives rise to a *tourist hub*, where, by this expression, we mean a situation where all tourists are concentrated in a single city. In contrast, when consumption amenities are weak, tourists are spread over different cities provided that an interior equilibrium exists, and in this case we study the interplay between a city's attractiveness in terms of historical or natural (exogenous) amenities and residents welfare.

Our paper is related to two main strands of literature. First, we contribute to the economic literature on urban amenities. Glaeser *et al.* (2001), who introduced the concept of "consumer city", argue that two types of amenities are particularly important for urban

[2]While the assumption that residents are immobile is restrictive, it also grants us one important advantage: it allows to study the consequences of unequal land endowments for the welfare of residents, sparing us the trouble to make assumptions on how the land endowment is disposed of when the resident relocates to another city.

success. On the one side, cities offer a rich variety of services and non-tradable consumer goods; on the other side, all attributes related to the aesthetics and the physical setting play an important role, since they are increasingly valued by consumers. In our terminology, the former falls in the category of endogenous amenities, whereas the latter falls in the category of exogenous amenities. Our paper builds on the importance of amenities for urban success, and presents an integrated framework to study how tourism affects urban amenities and real incomes, the implications for the welfare of residents, and how endogenous and exogenous amenities interact at the urban level. On the empirical side, there is a number of papers that study the link between the composition of local demand and product diversity. For instance, Waldfogel (2008) finds that the demographic mix of the population (i.e. ethnicity, income, education) affects the type of available restaurants across U.S. ZIP codes. Mazzolari and Newmark (2007) also find that the share of immigrants is related to the share of ethnic restaurants across Census tracts in California. Finally, Schiff (2015) finds that larger and denser markets offer both greater variety and rarer varieties of restaurants. Consistently with this literature, we document that in our data tourism and the number of restaurants and retail shops are correlated across Italian cities. Our theoretical findings are also consistent with Carlino and Saiz (2008), who show that the number of leisure visits to a city provides a good revealed-preference measure of local leisure amenities. Finally, in Lee (2010) land prices and consumption amenities shape the sorting pattern of high-skilled and low-skilled workers across cities, thus contributing to explain the urban wage premium. In our model, these same forces determine the set of residents who gain or lose from tourism, when we allow them to differ in terms of land endowments.

A second strand of literature that is related to our paper is the one about the impact of tourism on a local economy. Our baseline results are related to Copeland (1991), who studies a small open economy and presents two main findings: first, the welfare impact of tourism is positive, as long as it increases the relative price of non-tradables; second, under certain conditions tourism can lead to a contraction of the manufacturing sector in favour of the non-tradable sector. Chao et al. (2006) provide a similar analysis in the context of a dynamic macro model. In a recent paper, Faber and Gaubert (2017) find a positive welfare impact of tourism on the Mexican economy, using a structural spatial framework that includes productivity spillovers between the services and the manufacturing sector. We cast the discussion about the impact of tourism in an urban context that features historical amenities, consumption amenities, and unequal land endowments among residents.

The remainder of the paper is structured as follows. Section 2 presents some empirical patterns that we aim to replicate in in the model. Section 3 presents the baseline model. In section 4 we derive the key results concerning the welfare effects of tourism in the presence of an unequal land distribution among residents. In section 5 we generalize the model to a system of two cities. We then present in section 6 some further extensions to our setting. Finally, section 7 concludes.

2 Empirical patterns

In this section, we document the empirical association between tourism and some key economic variables across Italian municipalities, over the time period 2001 – 2011. Although these patterns should not be interpreted as causal effects, they provide motivation for the theoretical analysis that we develop in the following sections. At the same time, we ground our specifications in the functional forms that we derive from the model. We focus on the number of establishments and sectoral employment at the city level.

Our data come from two main sources. First, we use Italian Census data for years 2001 and 2011. The Industry and Services Census provides information on the number of establishments and the number of employees in each sector for all Italian municipalities, with sectors defined following the NACE classification. We complement this data set with the total resident population from the Population Census. Second, data on tourism activity come from the Annual Survey of the Capacity of Tourist Accommodation Establishments, conducted by the Italian National Institute of Statistics (Istat). This survey provides the number of overnight stays at the province level,[3] and the number of beds (a measure of capacity) at the municipality level. First, we allocate the number of overnight stays to each

[3]The province level corresponds to NUTS 3 in terms of the European geographical classification.

municipality proportionally to its relative within-province capacity. Second, in order to provide a measure of tourism in resident-equivalent terms, we divide the number of overnight stays by 365 (assuming that each resident spends 365 nights in his place of residence). Then, we construct our main explanatory variable as the number of tourists per 1000 residents at the municipality level.[4]

The basic specification we run is

$$\Delta y_{ij} = \alpha + \delta_1 \Delta \text{tourism}_{ij} + \delta_2 x_{ij} + \mu_j + \epsilon_{ij},$$

where: Δy_{ij} is the absolute change in the dependent variable of interest from 2001 to 2011 in municipality i within province j; $\Delta\text{tourism}_{ij}$ is the main explanatory variable, the absolute change in the number of resident-equivalent tourists per 1000 residents from 2001 to 2011 in municipality i in province j; x_{ij} is a set of controls, including total municipal land area, average elevation, and a dummy for coastal towns; μ_j is a set of 103 dummies, one for each province; ϵ_{ij} is the error term. Note that first differences control for all time-invariant factors that affect the level of y_{ij} at the municipality level; moreover, province dummies ensure that our variation comes from comparing municipalities within narrow and homogenous spatial units. We trim our data set in order to exclude municipalities with extremely low or high values for our main regressor $\Delta\text{tourism}_{ij}$.[5] The resulting empirical density function is depicted in figure 1.

[Insert Figure 1 about here]

Table 1 reports the descriptive statistics for the main variables used in the analysis, for our base year (2001) and for the change over the subsequent decade (2001-2011). A first observation that emerges from the table is that the spatial distribution of tourism is uneven. In 2001, on average, there were 19 tourists per 1000 residents in Italian municipalities, whereas the median was 1.5, and the 75th percentile was 8.4. Therefore, most municipalities host a small number of tourists, while a few municipalities host a large number of tourists.

[Insert Table 1 about here]

[4] More information on the data used is provided in the Appendix.

[5] We drop municipalities belonging to the top 1% and bottom 1% of the distribution.

Second, the number of tourists over 1000 residents increased (by 1.7 units) over our period of study; however, as shown in figure 2, this number masks a steep decline for the top 10% destinations (as of 2001), and a mild increase along the rest of the distribution, especially for the 8th and 9th deciles. For this reason, we run our main regressions both on the full sample and excluding the top-decile municipalities. Moreover, the number of hotels per 1000 residents and the number of restaurants and bars per 1000 residents increased, whereas the number of retail stores per 1000 residents decreased. A similar pattern emerges in terms of employment (the average change in employment in retail stores is small and positive, while the corresponding median change is small and negative).

[Insert Figure 2 about here]

In table 2 we report the results on tourism and the number of establishments for the different industries in our sample. We report in panel A the correlation between the change in the number of tourists per 1000 residents from 2001 to 2011 and the change in the number of establishments per 1000 residents over the same time period for the full sample of municipalities. We focus on industries that, in our view, represent important urban consumption amenities, both for residents and tourists: restaurants and bars (column 2), and different types of retail trade stores (columns 3-8); in the last column, we also report results for the tourist accommodation sector. The coefficients reported show that tourism is positively associated with the number of restaurants and bars, and with the total number of retail shops. For instance, in the case of Venice, back-of-the-envelope calculations show that the increase in restaurant and bars in the 2001-2011 period that can be related to the inflow of tourists is roughly equal to 80 establishments. Census data show that the total increase of business units in industry 56 over the same period of time amounts to 374. For Florence, which experienced a much lower increase in tourism, we estimate an increase of 14 restaurant and bars related to the tourists inflow, while the overall increase coming out from Census data totals 425 business units. In columns 4-8, we break down the 2-digit retail shops sector into its main 3-digit subsectors.[6] There is a positive and significant correlation

[6] We exclude from the analysis gas stations, ICT retail shops, retail sale via mail orders or via Internet, and second-hand market sales.

for specialized food shops, books, sport, toys and clothing and footwear. As expected, the number of accommodation establishments is also positively related to the change in the number of tourists.

[Insert Table 2 about here]

Panels B and C of table 2 check the robustness of these correlations. In panel B we show the results of the same regression, excluding the municipalities in the top decile of the tourists distribution in 2001. Results are broadly consistent. In panel C, as a second robustness check, we exclude municipalities with zero tourist density in either 2001, or 2011, or both years. Again, results are consistent, except in the regression on the number of food and beverages stores, where the coefficient is now insignificant.

How can we interpret the heterogeneity across industries? For example, why does tourism correlate with the number of specialized food shops but not with the number of non-specialized stores? And why is the coefficient on clothing and footwear higher than the coefficient on books, sport, and toys? Our model provides two different answers. First, as we show in section 3, the coefficient linking the number of establishments to the tourist flow should be smaller when economies of scale are large; second, as we discuss in section 6.2, the coefficient should be higher in those industries that are more represented in tourist expenditure.

In table 3 we replicate table 2, using as a dependent variable the change in city employment between 2001 and 2011, normalized by the resident population, for the same set of industries. The correlation is positive for restaurant and bars, and for the total number of employees in retail stores, confirming that municipalities that experienced stronger tourism inflows also specialized more towards the sectors producing urban consumption amenities. The effect is statistically significant for the books, sport, toys, and clothing and footwear industries.

[Insert Table 3 about here]

3 The baseline model

The city consists of a fixed resident population, n_R, and a fixed amount of land, H, which is used both for residential and for commercial purposes. Each resident supplies inelastically one unit of labour, so that the labour force is also equal to n_R. The number of tourists visiting the city is n_T. In the next sections, we take n_T as exogenously given. In section 5, we study how n_T is endogenously determined in a two-city system, given a total exogenous number of tourists N_T.

3.1 Preferences

Both residents ($i = R$) and tourists ($i = T$) have a Cobb-Douglas utility function defined over a bundle of non-tradable services and land:

$$U_i = A_i \left(\frac{C_i}{\gamma}\right)^{\gamma} \left(\frac{h_i}{1-\gamma}\right)^{1-\gamma}, \qquad 0 < \gamma < 1,$$

where A_i is the *exogenous* amenity level provided by the city, C_i is a bundle of differentiated non-tradable services, h_i is land consumption, and γ is the share of income allocated to non-tradable service consumption. As in the standard Dixit-Stiglitz formulation, we assume that C_i is a CES aggregate of a continuum of differentiated varieties:

$$C_i = \left(\int_0^m c_{ij}^{\varepsilon} dj\right)^{\frac{1}{\varepsilon}}, \qquad 0 < \varepsilon < 1,$$

where ε is the elasticity of substitution between different varieties and m is the mass (hereafter, number) of varieties supplied by the non-tradable sector. Since our focus is on the mobility of tourists, we set $A_R = 1$ and leave only A_T to matter in the rest of the analysis. A_T is an index broadly interpreted as those exogenous features of a city (monuments, museums, parks, etc.) that attract tourists. Let us call them historical amenities, with the understanding that this term may also include natural amenities. We model historical amenities as a preference shifter: a higher A_T increases the marginal utility of consumption in a given city. The number of varieties of the services sector plays in our setting the role of a consumption amenity. In fact, as is well known, under Dixit-Stiglitz preferences consumers' welfare is increasing in the number of differentiated varieties supplied by the market. We think of m as the number of restaurants, retail shops, and other activities connected with a thriving service sector. This number makes a city more or less attractive, and is endogenously determined. In our model, consistently with the empirical patterns we have documented, this number is related to the number of tourists visiting the city.

Some comments are in order. First, we assume that residents and tourists consume the same goods.[7] Second, we assume that residents and tourists devote the same share of their budget to land consumption. Third, assuming that all tourists consume land, we neglect the role of day-trippers.

Residents and tourists maximize utility subject to a budget constraint, which is given by:

$$\int_0^m p_{sj} c_{ij} dj + q h_i \leq I_i = \begin{cases} w + q\frac{H}{n_R} & \text{for } i = R \\ I_T & \text{for } i = T \end{cases}$$

where p_{sj} is the price of one unit of non-tradable services purchased from firm j, w is the wage rate, q is the price of one unit of land, H/n_R is the land wealth of a resident, and I_T is the exogenous tourist income, which we assume to be the same for all tourists.[8] In our model there is a unique labour market with perfectly mobile workers, and consequently the equilibrium wage rate is unique. Taking the first-order conditions, individual demands are given by:

$$\begin{aligned} c_{ij} = &\quad p_{sj}^{-\frac{1}{1-\varepsilon}} P_s^{\frac{\varepsilon}{1-\varepsilon}} \gamma I_i, \quad j = 1...m, \\ h_i = &\quad (1-\gamma)\frac{I_i}{q}, \end{aligned} \tag{1}$$

where P_s is the price index in the non-tradable sector, $P_s = \left(\int_0^m p_i^{\frac{-\varepsilon}{1-\varepsilon}} di \right)^{-\frac{1-\varepsilon}{\varepsilon}}$. As far as the price of each non-tradable service variety is the same (something that is true at equilibrium)

[7]In section 6.2, we consider the opposite assumption where residents and tourists consume different goods.

[8]Given homothetic preferences, the solution of the model only depends on aggregate expenditure, so this assumption entails no loss of generality.

the indirect utilities of residents and tourists are:

$$V_R = m^{\frac{\gamma(1-\varepsilon)}{\varepsilon}} \frac{w + q\frac{H}{n_R}}{p_s^{\gamma} q^{1-\gamma}}, \tag{2}$$

$$V_T = A_T m^{\frac{\gamma(1-\varepsilon)}{\varepsilon}} \frac{I_T}{p_s^{\gamma} q^{1-\gamma}}, \tag{3}$$

where p_s is the equilibrium price of differentiated varieties. We can see from these equations that welfare positively depends on two components: first, on the number m of non-tradable services varieties, due to the *love of variety effect*; second, it depends on *real incomes*, since nominal incomes I_R and I_T are deflated by the price index $p_s^{\gamma} q^{1-\gamma}$. In equilibrium, the number of tourists will influence welfare through both channels. Moreover, note that the nominal income of residents, $I_R = w + q\frac{H}{n_R}$, is endogenous, as it depends on wages and land prices. Instead, tourist nominal income I_T is fixed; however, in equilibrium tourist real income does respond to the number of tourists via its effect on prices.

Finally, aggregate demand for non-tradable variety j is given by:

$$n_R c_{R,j} + n_T c_{T,j} = p_{js}^{-\frac{1}{1-\epsilon}} P_s^{\frac{\varepsilon}{1-\varepsilon}} \gamma(w n_R + qH + n_T I_T). \tag{4}$$

Firms, in the services sector, take into account this relationship when maximizing their profits.

3.2 Production

In the city there are two sectors: a differentiated non-tradable sector (non-tradable services) and a homogenous intermediate sector, whose output is used in the production of non-tradable services and freely traded on world markets. We choose the homogenous good as the numeraire of the economy.

The non-tradable sector, indexed by s, is characterized by monopolistic competition. Each variety j is produced according to a Cobb-Douglas production function that combines labour, land, and the intermediate input under constant returns to scale. Therefore, output for each variety is equal to

$$y_{sj} = a_s l_{sj}^{\alpha_s} h_{sj}^{\beta_s} y_{kj}^{1-\alpha_s-\beta_s},$$

where a_s is the TFP in the non-tradable sector common to all firms, l_{sj} is laborr, h_{sj} is land, and y_{kj} is the quantity of intermediate input employed by firm j. The Cobb-Douglas coefficients sum up to 1. To enter the non-tradable sector, firms need a fixed requirement of η units of the intermediate input. In equilibrium, each firm will choose a different product variety, so that the number of firms is equal to m. Profit maximization, subject to (4), yields:

$$\begin{aligned} \varepsilon \alpha_s p_{sj} \tfrac{y_{sj}}{l_{sj}} &= w, \\ \varepsilon \beta_s p_{sj} \tfrac{y_{sj}}{h_{sj}} &= q, \\ \varepsilon (1-\alpha_s-\beta_s) p_{sj} \tfrac{y_{sj}}{y_{kj}} &= 1. \end{aligned} \tag{5}$$

Furthermore, free entry into the non-tradable sector ensures that in equilibrium all firms make zero profits:

$$\pi_{sj} = p_{sj} y_{sj} - w l_{sj} - q h_{sj} - y_{kj} - \eta = 0. \tag{6}$$

Clearly, given that all non-tradable firms share the same production function with the same TFP, they will charge the same price in equilibrium, $p_{sj} = p_s$ for all $j = 1, ..., m$, and demand the same amount of production factors. Manipulating conditions in (5) we get that

$$p_s = \frac{w^{\alpha_s} q^{\beta_s}}{\varepsilon \kappa_s a_s},$$

where $\kappa_s < 1$ is a constant.[9] From now on we drop subscript j. Aggregate labor demand in sector s is then given by $L_s = \int_0^m l_{sj} dj = m l_s$. Aggregate land demand (H_s) and intermediate input demand (Y_k) can be expressed in a similar way.

The intermediate sector, indexed by k, operates under constant returns to scale and uses labor only. The production function is $Y_k^o = a_k L_k$, where a_k is the TFP in the intermediate sector. Under our assumption of a single labor market, with workers freely mobile between sectors, and as long as $L_k > 0$, the wage rate is fixed and equal to the marginal revenue in the intermediate sector[10]:

$$w = a_k. \tag{7}$$

[9] See appendix 8.3.1

[10] If the intermediate sector also used land, this result would not hold, and we could not solve the model in closed form.

3.3 Equilibrium

There are four markets in our model: non-tradable services, land, labor, and the intermediate input. Equilibrium in each market requires:

$$n_R c_R + n_T c_T = y_s \qquad \text{(non-tradable market)} \tag{8}$$

$$n_R h_R + n_T h_T + m h_s = H \qquad \text{(land market)} \tag{9}$$

$$m l_s + L_k = n_R \qquad \text{(labour market)} \tag{10}$$

$$m(y_k + \eta) = Y_k^o + X \qquad \text{(intermediate input)} \tag{11}$$

where X are net aggregate imports of the intermediate input. In the market clearing conditions, we use the property of firm symmetry in the non-tradable sector. Equations (1), (5), (7), (12), and (8)-(11), characterize the general equilibrium in the city.

Market clearing and the zero-profit condition in the non-tradable sector imply:

$$n_T I_T = X.$$

This equation is important because it represents a current account balance condition between the city and the rest of the world. It says that tourist expenditure that flows into the city has to be perfectly matched by payments on intermediate inputs that flow out of the city, either due to net imports or total entry costs.

Our first result states that an expansion in tourism leads cities to specialize in the services sector. To show this, let us derive an expression for the labour force employed in the services sector s as a function of the number of tourists. First, optimal firm behavior in both sectors allows us to write:

$$\begin{aligned} wL_s &= \alpha_s \varepsilon p_s Y_s \\ &= \frac{\alpha_s}{1-\alpha_s-\beta_s} Y_k \\ &= \frac{\alpha_s}{1-\alpha_s-\beta_s}(Y_k^o + X - m\eta) \\ &= \frac{\alpha_s}{1-\alpha_s-\beta_s}(wL_k + n_T I_T - m\eta), \end{aligned}$$

where we have also used the market clearing condition (11) in the third equality, and the current account balance condition in the fourth equality. Second, using the labour market clearing condition (10), we obtain:

$$wL_s = \frac{\alpha_s}{1-\beta_s}(wn_R + n_T I_T - m\eta).$$

which depends on the wage rate and on the number of firms. Finally, we can write the zero profit condition in sector s (12) in terms of wL_s as

$$\pi_s = 0 \iff \frac{1-\varepsilon}{\varepsilon}\frac{wL_s}{\alpha_s} = m\eta, \tag{12}$$

and substitute it back into the previous expression to obtain

$$\frac{L_s}{n_R} = \frac{\alpha_s \varepsilon}{1-\beta_s \varepsilon}\left(1 + \frac{n_T I_T}{wn_R}\right). \tag{13}$$

As long as $L_k > 0$, so that $w = a_k$, this expression pins down L_s as a function of n_T. It says that the labour force employed in the non-tradable sector is increasing in the number of tourists who visit the city. Then, it is easy to establish the following proposition.

Proposition 1. *The share of the labor force employed in the services sector,* $\frac{L_s}{n_R}$, *is increasing in the number of tourists in a city,* n_T.
When the number of tourists is greater than a threshold $\widehat{n}_T$ *the city becomes fully specialized in non-tradable services, that is,* $\frac{L_s}{n_R} = 1$.

The economic intuition behind this result is simple, and, in general, it is related to the economic literature on tourism and the Dutch disease - see, for instance, Copeland (1991), Chao *et al.* (2006). Since services are not tradable, increased tourist demand pushes up revenues in the non-tradable sector, whereas the price for the intermediate input is fixed on world markets. Hence, the economy moves factors of production to the non-tradable sector and substitutes the domestic production of the intermediate input with imports. Table 3, in section 2, presents empirical evidence that is consistent with Proposition 1.

When the number of tourists is greater or equal than $\hat{n}_T$, the intermediate sector disappears and the city economy becomes fully-specialized in the non-tradable sector. Setting $L_s = n_R$ in (**??**), we can derive a closed-from expression for $\hat{n}_T$:

$$\hat{n}_T \equiv \frac{1-(\alpha_s+\beta_s)\varepsilon}{\alpha_s \varepsilon}\frac{a_k n_R}{I_T}.$$

It is increasing in the productivity of the intermediate sector, a_k, and in the resident population, n_R. Therefore, larger cities, as well as cities where the intermediate sector is more productive, can host a larger number of tourists before full specialization ensues.

To get a sense of the magnitude of this threshold, let us provide a simple parametrization. Following the estimates of Valentinyi and Herrendorf (2008) for the services sector, we set $\alpha_s = 0.65$ and $\beta_s = 0.2$. Given there is no construction sector in our model, we include both land and structures into the factor of production land. Also, we set the elasticity of substitution between product varieties $\frac{1}{1-\varepsilon} = 4$, implying $\varepsilon = 0.75$. Given these values, the share of tourists over the residents such that cities become fully specialized in services, $\frac{\hat{n}_T}{n_R}$, is equal to a fraction 0.75 of $\frac{a_k}{I_T}$, the ratio of local wages over tourist expenditure. Even neglecting the fact that in reality tourist expenditure is higher than local wages, this cutoff remains very high. Therefore, the model suggests that only under very special circumstances should we observe full specialization in the service sector at the city level. In our sample of Italian municipalities, in year 2001, the ratio $\frac{n_T}{n_R}$ has a mean of roughly 0.02, and exceeds 0.5 in about 90 municipalities, most of which are ski resorts in the Alps.

Let us now compute the equilibrium in our city. For $n_T \geq \hat{n}_T$, the city becomes fully specialized in the production of non-tradable services. In this case, equation (13), with $L_s = n_R$, determines the equilibrium wage. We obtain:

$$w = \begin{cases} a_k & \text{for } n_T < \hat{n}_T, \\ \kappa_w^F \frac{n_T I_T}{n_R} & \text{for } n_T \geq \hat{n}_T. \end{cases} \tag{14}$$

where κ_w^F is a constant.[11] The wage rate is a continuous, non-decreasing function of n_T with a kink at $\hat{n}_T$.

[Insert Figure 3 about here]

The reason is the following: as soon as the entire labor force is employed in the non-tradable sector, the wage rate is no longer tied to the price of the intermediate input, that is set on world markets; instead, it responds to local labor demand. Furthermore, given

[11] To index the constant terms, we use P for the partial specialisation scenario and F for the full specialisation scenario.

that labor supply is fixed at n_R and production function is Cobb-Douglas, the wage rate is proportional to aggregate demand in the non-tradable sector and, thus, to the number of tourists n_T. We now show that this kink is passed on to other economic variables: the number of firms, prices, and welfare.[12]

Combining equations (12) and (13) with $w = a_k$, the number of firms in the non-tradable sector is:

$$m = \begin{cases} \kappa_m^P \frac{a_k n_R + n_T I_T}{\eta} & \text{for } n_T < \hat{n}_T, \\ \kappa_m^F \frac{n_T I_T}{\eta} & \text{for } n_T \geq \hat{n}_T, \end{cases} \tag{15}$$

with $\kappa_m^P < \kappa_m^F$. To solve for the land price q, write $qH_s = \frac{\beta_s}{\alpha_s} w L_s$ and substitute this expression, together with (13), into the market clearing condition for land (9). We get:

$$q = \begin{cases} \kappa_q^P \frac{a_k n_R + n_T I_T}{H} & \text{for } n_T < \hat{n}_T, \\ \kappa_q^F \frac{n_T I_T}{H} & \text{for } n_T \geq \hat{n}_T \end{cases} \tag{16}$$

with $\kappa_q^P < \kappa_q^F$. The expression for H_s follows immediately:

$$H_s = \frac{\beta_s \varepsilon \gamma}{1 - \gamma + \beta_s \varepsilon \gamma} H.$$

Note that, due to the Cobb-Douglas assumption on both utility and production, the non-tradable sector always employs a constant fraction of the city land, regardless of the number of tourists in the city. Finally, we need to recover the price for non-tradable services, p_s. From the first order condition for the non-tradable sector, $p_s = \frac{w^{\alpha_s} q^{\beta_s}}{\varepsilon \kappa_s a_s}$, plugging in w and q,

$$p_s = \begin{cases} \frac{(\kappa_q^P)^{\beta_s}}{\varepsilon \kappa_s} \frac{a_k^{\alpha_s}}{a_s} \left(\frac{a_k n_R + n_T I_T}{H} \right)^{\beta_s} & \text{for } n_T < \hat{n}_T, \\ \frac{(\kappa_w^F)^{\alpha_s} (\kappa_q^F)^{\beta_s}}{\varepsilon \kappa_s} \frac{(n_T I_T)^{\alpha_s + \beta_s}}{a_s n_R^{\alpha_s} H^{\beta_s}} & \text{for } n_T \geq \hat{n}_T. \end{cases} \tag{17}$$

Let us make some comments about the relationships we derived so far. First, note that w, m, q and p_s are all non-decreasing in the number of tourists, with a kink at $\hat{n}_T$.

[12] The Cobb-Douglas formulation implies that the elasticity of substitution between factors of production is equal to one. In section 6.3, we extend the model to allow for a higher elasticity of substitution between labor and the intermediate input. Intuitively, this raises the threshold $\hat{n}_T$ and flattens the wage response to tourism under full specialization.

The variables m, q and p_s are indeed strictly increasing in n_T, but while the number of firms and the land price have a steeper slope in the full specialisation scenario than under partial specialisation, the slope can be steeper or flatter for the price of non-tradable services depending on the size of the resident population, n_R. Second, and more importantly, note that whereas m and q are linear in the number of tourists, p_s is a concave function. As we will show, this result has important implications for the welfare impact of tourism. Finally, as far as m is concerned, table 2 in section 2 presents empirical evidence that is consistent with equation (15).

3.4 Welfare analysis

What is the impact of tourism on the welfare of residents? As we discussed earlier – see equation (2) – the number of tourists affects the welfare of residents through two channels: consumption amenities and real incomes. The effect on consumption amenities is always positive - see equation (15): tourism boosts growth in services, increasing the number of available varieties. In contrast, the sign of the real income effect is not obvious: as tourists flow into the city, the resident population earns better wages and rents, but also faces higher consumption prices. The following proposition characterizes the overall impact of tourism on the welfare of residents.

Proposition 2. *The welfare of residents, V_R, is always increasing in the number of tourists, n_T.*

Proof. See the Appendix. □

This result is easier to understand in the full specialisation scenario. In this case, resident nominal income, I_R, is linear in the number of tourists, n_T, as tourist expenditure causes a proportional increase in wages w and land prices q. In contrast, the price index $p_s^{\gamma}q^{1-\gamma}$ is a concave function of the number of tourists. The economic reason is that the marginal cost in the non-tradable sector depends not only on w and q, but also on the tradable input, whose price is fixed on the world market and therefore does not react to tourism inflows.

The net effect on resident real income is positive, because the numerator grows more than the denominator. The increasing number of varieties further reinforces this positive effect.

Although the intuition is similar, things are more subtle in the partial specialization scenario. In this case, resident wages are also fixed, so that the impact of tourism runs through land prices only. The effect of tourism on real land income is always positive: nominal land income rises linearly with the number of tourists, whereas the price index $p_s^\gamma q^{1-\gamma}$ is concave. In this case the effect of tourism on real wages is always negative, but the positive real land income and consumption amenity effects prevail. Therefore, also in the partial specialization case, the total welfare effect of tourism on residents is positive.

As far as real income is concerned, proposition 2 is related to the result in Copeland (1991), that tourism improves welfare as long as it increases the price of non-tradables. However, our model also features monopolistic competition in the service sector; thus, it allows to shed light on endogenous consumption amenities and to study their importance for welfare in conjunction with real income effects.

Let us now turn to the welfare of tourists. Again, the effect going through consumption amenities is always positive. In contrast, the real income effect is always negative, as tourist nominal income is fixed at I_T and doesn't adjust to the tourism-related hike in prices. Which of the two effects prevails? The following proposition shows that tourists are better off in tourism-crowded cities as long as the non-tradable sector is sufficiently differentiated.

Proposition 3. *Under partial specialisation, $n_T < \hat{n}_T$, the welfare of tourists, V_T, is increasing in the number of tourists, n_T, if and only if*

$$\varepsilon < \frac{\gamma}{1+\beta_s\gamma} \equiv \hat{\varepsilon}^P.$$

Under full specialisation, $n_T \geq \hat{n_T}$, the welfare of tourists, V_T, is increasing in the number of tourists, n_T, if and only if

$$\varepsilon < \frac{\gamma}{1+\gamma(\alpha_s+\beta_s)} \equiv \hat{\varepsilon}^F,$$

with $\hat{\varepsilon}^F < \hat{\varepsilon}^P$.

Proof. See the Appendix. □

The economic intuition behind this result is simple. When the elasticity of substitution in the non-tradable sector, ε, is sufficiently high, the gains from variety are low and the negative real income effect prevails. In this case, the impact of tourism on the welfare of tourists is negative. However, provided that ε is sufficiently low, the gains from variety overcome the real income losses, and an increase in the number of tourists, n_T, brings a positive effect on the welfare of tourists themselves. Under partial specialization, $n_T < \hat{n}_T$, non-tradable and land prices grow less steeply with n_T. The negative real income effect stemming from the tourist inflow is less hard, and it is more likely to be overwhelmed by the benefits from expanding product variety. This explains why $\hat{\varepsilon}^F < \hat{\varepsilon}^P$. In the remainder of the paper, we say that consumption amenities are *strong* when $\varepsilon < \hat{\varepsilon}^P$ (strongly differentiated services sector), and that consumption amenities are *weak* when $\varepsilon \geq \hat{\varepsilon}^P$ (poorly differentiated services sector).

It follows that, when $\varepsilon < \hat{\varepsilon}^F$, tourists benefit from more tourism in all scenarios; when $\varepsilon > \hat{\varepsilon}^P$, tourists loose from more tourism in all scenarios; when $\hat{\varepsilon}^F > \varepsilon > \hat{\varepsilon}^P$, tourists benefit from more tourism under partial specialization, but loose from more tourism when the city is fully specialized.

As a final comment, we underscore the role of nominal income for the results of this section. When nominal income is fixed as with tourists, tourism may increase or decrease welfare, depending on the strength of consumption amenities. In contrast, when the nominal income is free to adjust as with residents, either through wages or land prices, tourism always increases welfare. Under partial specialization, the wage is fixed and only the land price responds to tourism. Therefore, Proposition 2 crucially depends on the assumption that all residents have equal land endowments. In the next section, we show how the picture changes when land is unequally distributed among residents.

4 Welfare effects of tourism with unequal land endowments

Proposition 2 delivers the sharp result that residents always benefit from tourism, under the assumption that land is equally distributed across residents. In this section we show that a more complex picture emerges if we take into account the fact that land is unequally distributed among residents. In particular, in a context of partial specialization in services and where residents have unequal land endowments, we show that: *(i)* tourism always increases welfare inequality; *(ii)* tourism causes welfare losses among some residents, unless consumption amenities are strong enough. The results of the previous section still hold for the representative resident and, consequently, they are valid at the aggregate level.

Suppose, then, that land is unequally distributed across residents. Each resident i is endowed with an amount of land H_i, with the only restriction that $\sum_{i=1}^{n_R} H_i = H$. Individual income is then $I_{Ri} = w + qH_i$, where H_i may well be zero for a group of residents (call them workers) whose only source of income is the wage. Define real income of residents as $\tilde{I}_{Ri} = \frac{I_{Ri}}{p_s^{\gamma} q^{1-\gamma}}$, and welfare is $V_{Ri} = m^{\frac{\gamma(1-\varepsilon)}{\varepsilon}} \tilde{I}_{Ri}$. Our measure of welfare inequality among any two individuals is the ratio of their indirect utilities; then, welfare inequality perfectly matches real income inequality, as m is the same for all residents and vanishes by taking the ratio:

$$\frac{V_{Ri'}}{V_{Ri}} = \frac{\tilde{I}_{Ri'}}{\tilde{I}_{Ri}}.$$

Thus, tourism affects welfare inequality only through real incomes. Because of homothetic preferences, all aggregate variables, such as prices and factor allocations, only depend on the total amount of land in the city, H. This implies that the equilibrium we derived in the previous sections holds (in aggregate terms) independently of the land distribution across residents.

Let us start from the partial specialization scenario, when $n_T < \hat{n}_T$ and the city produces both services and the intermediate input. We present our results in the following proposition.

Proposition 4. *When the city is partially specialized, $n_T < \widehat{n}_T$, (i) tourism increases welfare inequality among residents; (ii) when consumption amenities are weak, $\varepsilon > \widehat{\varepsilon}^P$,* *tourism induces welfare losses for those residents whose share of land endowment, H_i/H, falls below a cutoff $\widehat{h}$, with $\widehat{h} > 0$.*

Proof. See the Appendix. □

This proposition makes essentially two points. When the wage is fixed to a_k as with partial specialization, wealthier residents obtain a larger share of their income from their land endowment; in this case tourism, which increases land rents, brings a larger relative benefit to wealthier residents, thus raising welfare inequality.

The second result is that, for some residents, the welfare effect could even be negative. In particular, this is the case when

$$\frac{H_i}{H} < \frac{\varepsilon - \gamma + \beta_s \gamma \varepsilon}{1 - \gamma + \beta_s \gamma \varepsilon} \frac{a_k}{a_k n_R + n_T I_T} \equiv \widehat{h}.$$

When consumption amenities are weak ($\varepsilon > \widehat{\varepsilon}^P$) this threshold is positive. The implication is that poorer residents, whose land endowment falls below $\widehat{h}$ (and in particular workers, whose land endowment is nil), lose from tourism. On the contrary, when consumption amenities are strong, the love of variety effect more than compensates the negative effect on real incomes, and *all* residents gain from tourism.[13]

Note that our analysis holds given *any* land distribution; however, the actual number of residents who fall below or above the threshold depends on the exact shape of the land distribution function at the city level. As an illustration, consider our baseline case of equal land endowments, $H_i = \frac{H}{n_R}$: then, it is easy to see that *all* residents fall above the threshold and gain from tourism. As a second example, suppose that land is equally distributed among $n_R^H \equiv n_R - n_R^w$ land-owners, where n_R^w is a given number of workers; that is, residents with zero land endowment. Then, according to our analysis, n_R^w residents lose from tourism, whereas the aggregate gain is shared among the n_R^H land-owners.

Let us add some interesting remarks about the threshold $\widehat{h}$. First, the threshold $\widehat{h}$ is smaller when labor productivity in the tradable sector, a_k, is low, and when the resident

[13]Notice that $\widehat{\varepsilon}^P$ is the same threshold that regulates when tourists are hurt or not by tourism. With partial specialization of the city ($n_T < \widehat{n}_T$) both workers and tourists earn a fixed income, so their welfare will be increasing in n_T only if the non-tradable sector is highly differentiated.

population, n_R, is large. Then, given two cities with the same distribution of land among residents and the same number of tourists, n_T, our model predicts that a marginal increase in tourism will benefit a larger share of residents in the less productive and bigger city.

Second, $\widehat{h}$ itself is a *decreasing* function of n_T, with the implication that for some residents the effect of tourism on welfare is non-monotone. Given a certain initial value for n_T, think of a resident whose land endowment is slightly below the cutoff. An increase in n_T initially reduces his welfare. But as the number of tourists grows (thus reducing the threshold $\widehat{h}$) he may end up in a situation where his endowment is above the cutoff, with the welfare effect of n_T being now positive.

We stress however that the set of residents who always gain and always lose from tourism, in a partial specialization scenario, is independent of n_T. Since $\widehat{h}$ is decreasing in n_T, a resident i whose marginal benefit from tourism is already positive for $n_T = 0$ will gain from a further increase in tourism. This is the case for:

$$\left.\frac{\partial V_{R,i}}{\partial n_T}\right|_{n_T=0} > 0 \iff \frac{H_i}{H} > \frac{\varepsilon - \gamma + \beta_s \gamma \varepsilon}{1 - \gamma + \beta_s \gamma \varepsilon} \frac{1}{n_R}.$$

On the contrary, a resident i whose marginal benefit from tourism is negative at $\widehat{n}_T$ (the threshold for full specialization) will lose *a fortiori* from tourism for all $n_T < \widehat{n}_T$. This is the case for:

$$\left.\frac{\partial V_{R,i}}{\partial n_T}\right|_{n_T=\widehat{n}_T} < 0 \iff \frac{H_i}{H} < \frac{\varepsilon - \gamma + \beta_s \gamma \varepsilon}{1 - \gamma + \beta_s \gamma \varepsilon} \frac{\alpha_s \varepsilon}{1 - \beta_s \varepsilon} \frac{1}{n_R}.$$

The different possibilities are illustrated in figure 4, where we plot the indirect utility profile for residents who always benefit from tourism (green line), those who always lose from tourism (red line), and those with an intermediate endowment who first lose and then benefit from tourism (blue line).

[Insert Figure 4 about here]

With the following proposition we show that when the city fully specializes in the non-tradable sector (n_T reaches $\widehat{n}_T$) all residents (workers included) benefit from tourism.

Proposition 5. *When the city is fully specialised in the non-tradable sector, $n_T \geq \hat{n}_T$, (i) tourism does not increase welfare inequality and (ii) tourism makes all residents better off.*

Proof. See the Appendix. □

We know that when the city is fully specialized in the non-tradable sector both wages and land prices are linear in the number of tourists. In this case, tourism does non affect relative incomes.

5 Amenities and welfare in a system of two cities

In this section, we study the spatial equilibrium of tourists across alternative destinations. The parameter A_T, the level of historical amenities, is going to play a role in this section: since A_T enters tourist welfare, the mobility of tourists creates a link between local historical amenities and the endogenous variables of the model, including consumption amenities and the welfare of residents. Cities with a rich historical heritage will attract more tourist demand, and therefore have higher land prices, consumption prices, and a larger and more differentiated services sector. In a context of unequal land endowments, higher historical amenities are also associated with higher welfare inequality and welfare losses for poorer residents.

To keep things simple, we focus on a simple system of two cities that differ in terms of four exogenous parameters: the level of historical amenities enjoyed by tourists, the TFP of the tradable and non-tradable services sectors, the number of residents and the stock of land.[14] Both cities are small economies that can freely trade with each other and with the rest of the world. This modeling approach is in the spirit of the Rosen-Roback classic framework (Rosen, 1979; Roback, 1982), with the difference that, in our model, the resident population is fixed, while there is a second class of agents, tourists, who are mobile across cities. We still treat the total number of tourists in the urban system, N_T, as exogenous.

Let ϕ denote the fraction of the total tourist population N_T choosing city 1, $n_{T,1} = \phi N_T$.

[14] The results can be easily extended to the case where cities also differ in the fixed entry cost in the services sector.

Tourists are freely mobile across the two destinations. Then, spatial equilibrium requires:

$$
\begin{aligned}
& \Delta V(\phi) \equiv V_{T,1}(\phi) - V_{T,2}(\phi) = 0, \quad \text{and} \quad 0 < \phi < 1 \\
\text{or} \qquad & \Delta V_T(\phi) \leq 0, \quad \text{and} \quad \phi = 0 \\
\text{or} \qquad & \Delta V_T(\phi) \geq 0, \quad \text{and} \quad \phi = 1,
\end{aligned}
$$

meaning that no tourist has an incentive to change his choice of destination. The properties of the equilibrium with two cities depend on whether tourist welfare, V_T, is increasing or decreasing in the number of tourists who choose a certain destination. In turn, according to Proposition 3, whether V_T is increasing or decreasing in the number of tourists depends on two things: the specialization pattern of the city in the service sector, and the strength of the consumption amenities. To keep the exposition simple, we focus on the case where both cities are partially specialized in non-tradables, even when all tourists go to the same city.[15] Then, we have to distinguish between two cases: weak consumption amenities and strong consumption amenities.

5.1 Weak consumption amenities

The existence of an interior equilibrium where tourists visit both cities requires that $V_{T,1}(\phi) = V_{T,2}(\phi)$ for $0 < \phi < 1$. The interior equilibrium is unique if and only if the following conditions hold:

$$\frac{\partial \Delta V_T(\phi)}{\partial \phi} < 0 \quad \text{for} \quad 0 < \phi < 1, \tag{18}$$

$$\Delta V_T(0) > 0, \tag{19}$$

$$\Delta V_T(1) < 0. \tag{20}$$

When the non-tradable sector supplies poorly differentiated varieties ($\varepsilon \geq \widehat{\varepsilon}_P$) the effect of consumption amenities on welfare is weak. We know that in this case tourist welfare is decreasing in the number of tourists visiting the city. As a result, the differential ΔV_T is decreasing in ϕ, and condition (18) is verified. The closed-form expression of the interior

[15] In other terms we are assuming that $N_T < min[\widehat{n}_{T,1}, \widehat{n}_{T,2}]$. In Appendix 8.5, we also provide the analysis for the case where full specialization occurs in one or both cities.

equilibrium is

$$\phi = \frac{TP_1}{TP_1 + TP_2} + \frac{TP_1 a_{k,2} n_{R,2} - TP_2 a_{k,1} n_{R,1}}{TP_1 + TP_2}, \tag{21}$$

where the two terms, labeled TP_1 and TP_2, can be interpreted as the *tourist potential* of a city in terms of historical amenities, tradable and non-tradable sectors productivity, and total land:

$$TP_1 \equiv \left(\frac{A_1 a_{s,1}^{\gamma} H_1^{1-\gamma+\beta_s\gamma}}{a_{k,1}^{\alpha_s\gamma}} \right)^{1/\delta},$$
$$TP_2 \equiv \left(\frac{A_2 a_{s,2}^{\gamma} H_2^{1-\gamma+\beta_s\gamma}}{a_{k,2}^{\alpha_s\gamma}} \right)^{1/\delta},$$

where $\delta \equiv (1 - \gamma + \beta_s\gamma) - \frac{\gamma(1-\varepsilon)}{\varepsilon} > 0$. The tourist potential of a city is positively related to the level of the historical amenity, the productivity of the non-tradable sector, the land stock, and it is inversely related to the productivity of the tradable sector (which equals the wage rate under partial specialization). The effect of A is obvious, since it is a parameter that enters directly into the utility function of tourists. The effect of H works through a reduction in the price of land, see equation (16), and in the price of non-tradable services, see equation (17). The parameter a_s makes a city more attractive through a reduction in p_s again. A rise in a_k (and in the city's wage rate) makes it less attractive through a corresponding rise in q and p_s.

To ensure the existence of the interior equilibrium we need to elaborate more on conditions (19) and (20). Going back to the existence of the interior equilibrium, merging conditions (19) and (20), we get the following restriction on the ratio of the tourist potential of the two cities:

$$\frac{1}{\frac{a_{k,2} n_{R,2}}{a_{k,1} n_{R,1}} + \frac{N_T I_T}{a_{k,1} n_{R,1}}} < \frac{TP_1}{TP_2} < \frac{a_{k,1} n_{R,1}}{a_{k,2} n_{R,2}} + \frac{N_T I_T}{a_{k,2} n_{R,2}}. \tag{22}$$

This condition is satisfied as far as the two cities are not too dissimilar. When it does not hold, we get the concentration of tourists in a single city (either $\phi = 0$ or $\phi = 1$ in equilibrium). We label this situation a *tourist hub*. These two cases - interior equilibrium and tourist hub - are depicted in figure 5.

[Insert Figure 5 about here]

5.2 Strong consumption amenities

When the non-tradable sector supplies highly differentiated varieties ($\varepsilon < \widehat{\varepsilon}_P$) the effect of the consumption amenities is strong. According to proposition 3, tourists welfare is increasing in the number of tourists visiting a city. Then, the following property is satisfied:

$$\frac{\partial \Delta V_T(\phi)}{\partial \phi} > 0 \quad \text{for} \quad 0 < \phi < 1.$$

Whenever it exists, the interior spatial equilibrium is not stable. The only stable equilibria are the corner solutions $\phi^* = 0$ and $\phi^* = 1$, where tourists cluster in one of the two cities. A highly differentiated non-tradable sector leads to the emergence of a *tourist hub*, since tourists keep flowing into one city in spite of rising prices. This situation is depicted in figure 6.

[Insert Figure 6 about here]

In order to answer which city will become the tourist attractor we need to differentiate among different cases. First consider the case where $\Delta V_T(0) < 0$ and $\Delta V_T(1) > 0$. In order to fulfill these two conditions the tourist potential of the two cities shall verify:

$$\frac{a_{k,1}n_{R,1}}{a_{k,2}n_{R,2}} + \frac{N_T I_T}{a_{k,2}n_{R,2}} < \frac{TP_1}{TP_2} < \frac{1}{\frac{a_{k,2}n_{R,2}}{a_{k,1}n_{R,1}} + \frac{N_T I_T}{a_{k,1}n_{R,1}}}.$$

In such a case the interior equilibrium exists but is unstable. Accordingly, perturbing the interior equilibrium leads to the clustering of tourists in either city 1 or city 2, depending on the sign of the shock: shocks increasing the number of tourists in a city will eventually bring all tourists there. When $\Delta V_T(0) < 0$ and $\Delta V_T(1) < 0$, tourists will always head to city 2. Finally, when $\Delta V_T(0) > 0$ this also implies that $\Delta V_T(1) > 0$, and city 1 will be the tourist hub.

We derive the conclusion that the emergence of a tourist hub is possible under both strong and weak consumption amenities. An interior equilibrium where tourists visit both cities can be stable only if consumption amenities are weak. The emergence of a tourist hub then follows two different channels. First, it may be driven by the fact that a city is more attractive for tourists in terms of some exogenous features, such as those entering our definition of tourist potential (*first nature* cause). Alternatively, when endogenous amenities are strong, it may arise following a process of *circular cumulative causation*, where a city who gains a little advantage in terms of tourists eventually absorbs all of them (*second nature* cause). This structure is reminiscent of the agglomeration patterns of the New Economic Geography literature (see for instance Baldwin et al., 2005).

5.3 Historical amenities, city equilibrium and welfare

We can now go back to equations (15) – (17) to obtain the endogenous variables of the model in terms of the tourism potential of both destinations. Let us focus on city 1. Historical amenities affect prices, sectoral specialization and welfare through their effect on ϕ, whereas tradable and non-tradable sector's productivity and the amount of land have both an indirect effect through ϕ and a direct one on the endogenous variables. Under partial specialization we find the following. The share of the labour force employed in a city in the non-tradable sector, L_s/n_R, the number of firms in the non-tradable sector, m, the price of land, q, and the price of non-tradable goods, p_s, are positively related the level of historical amenities in a given city, A. The same results hold true under full specialization, with the only exceptions that the share of the labour force in the service sector is obviously fixed in the case, and historical amenities have a positive effect on wages from equation (14). Cities with stronger historical amenities have, on one hand, higher consumption amenities (through m) and higher land income (through q); on the other hand, through q and p_s, they have higher prices for the goods that enter the utility function, namely non-tradable services and land.

We are now in a position to study the relationship between historical amenities and the welfare of residents. Given that A influences the equilibrium of the model only through ϕ, propositions 2 and 4 can be immediately generalized to the case where the number of tourists visiting a city is endogenous and, in particular, it is increasing in the historical amenities that a city exhibits.

Proposition 6. *Aggregate resident welfare, V_R, is higher in cities with higher historical amenities, A. If residents are characterized by unequal land endowments, an increase in* *historical amenities increases welfare inequality among residents, and induces welfare losses for those residents whose share of land falls below the threshold* $\widehat{h}$.

Note that historical amenities do not appear directly in the residents' utility function. In fact, all welfare effects on residents described in proposition 6 occur only through the mobility of the tourist population and its impact on the endogenous variables.

6 Extensions

6.1 Congestion effects

In our model, tourism always improves the aggregate welfare of residents, even as the number of tourists becomes very large. The policy implication would be that cities should attract more and more tourists with no upper bound. However, excessive tourism may cause a number of problems such as increased commuting times, noise, congestion on public transports, etc.[16] These issues represent a form of non-market congestion. To introduce them we develop a simple extension of our framework. Let us bring back into the model the parameter A_R, indexing local amenities for residents, such that the utility of residents is:

$$U_i = A_R \left(\frac{C_R}{\gamma}\right)^{\gamma} \left(\frac{h_R}{1-\gamma}\right)^{1-\gamma}, \qquad 0 < \gamma < 1.$$

We assume that the amenity A_R is subject to non-market congestion; that is, it depreciates as the number of tourists in the city n_T increases. More specifically, let $A_R \equiv A_R(n_T)$, with $\frac{\partial A_R}{\partial n_T} < 0$. Since A_R doesn't enter the maximization problem, the equilibrium allocation is the same as before. Thus, we can write the indirect utility of residents as $\tilde{V}_R \equiv A_R V_R$, where V_R is the equilibrium welfare of residents in the baseline case – see section 3. In this case, under fairly standard assumptions on the function $A_R(n_T)$, it is possible to show that there exists an optimal number of tourists, n_T^*, that maximizes $\tilde{V}_R$.

As an illustration, suppose that $A_R(n_T) = e^{-\rho n_T}$; then,

$$\frac{\partial \tilde{V}_R}{\partial n_T} < 0 \iff -\frac{\partial A_R}{\partial n_T}\frac{n_T}{A_R} > \frac{\partial V_R}{\partial n_T}\frac{n_T}{V_R}$$

[16] For a review of these issues, see Garcia-Hernandez *et al.* (2017) or McKinsey (2017).

and we get the condition

$$\rho > \frac{\partial V_R}{\partial n_T}\frac{1}{V_R}. \tag{23}$$

We are comparing two elasticities with respect to the number of tourists: the elasticity of non-market congestion and the combined elasticity of love of variety and real income effects, as summarized by V_R. Now, note that, in our model, the right-hand side of (23) is monotonically decreasing in n_T, both under partial and full specialization. Then, for low levels of tourism ($n_T < n_T^*$) the combination of increasing real incomes and increasing consumption amenities prevail over non-market congestion forces;[17] for high levels of tourism ($n_T > n_T^*$), the opposite is true. Consequently, with congestion effects the welfare of residents is hump-shaped in the number of tourists, with a bliss point at n_T^*.

6.2 Different goods for residents and tourists

So far we have assumed that residents and tourists consume the same goods. However, it can be argued that the consumption basket of residents and tourists is actually quite different. Let us examine this issue in the polar case where residents and tourists consume two disjoint sets of differentiated varieties. For simplicity, we return to the baseline case where land is equally distributed among residents. There is a sector r, that supplies differentiated varieties to residents, and a sector t, that supplies differentiated varieties to tourists (lower-case subscripts indicate the firm side, whilst upper-case letters indicate the consumer side). The CES bundle for residents is $C_R = \left(\int_0^m c_{Rj}^{\varepsilon} dj\right)^{\frac{1}{\varepsilon}}$, whereas for tourists it is: $C_T = \left(\int_0^m c_{Tj}^{\varepsilon} dj\right)^{\frac{1}{\varepsilon}}$. We assume that the technology is the same in both sectors, and that labour is perfectly mobile, so that the wage is equalized. Then, since the marginal cost and the mark-up are the same, firms in the two sectors also charge the same price: $p_{sr} = p_{st} = p_s$.

Under these assumptions, it is possible to show that, in aggregate terms, the model has the same equilibrium as in the baseline case, with $L_s = L_{sr} + L_{st}$ and $m = m_r + m_t$ (all

[17]We require that ρ is not too large, so that the condition holds for $n_T \to 0$ - in this way, we avoid the trivial case where welfare is decreasing from the outset.

derivations are shown in the Appendix). Then, we obtain:

$$
\begin{aligned}
m_r =& \frac{1-\varepsilon}{1-\beta_s\varepsilon}\frac{(1+\kappa_q^P)a_k n_R + \kappa_q^P n_T I_T}{(1+\kappa_q^P)\eta}, \\
m_t =& \frac{1-\varepsilon}{1-\beta_s\varepsilon}\frac{n_T I_T}{(1+\kappa_q^P)\eta}.
\end{aligned}
$$

These expressions allow us to make a number of interesting points. First, tourism increases the relative size of the tourist sector, as the ratio m_t/m_r is increasing in the number of tourists. Second, the ratio m_t/m_r tends to a finite number $(1/\kappa_q^P)$ for $n_T \to \infty$; therefore, although the city eventually becomes fully specialized in non-tradable services, it never fully specializes in tourist services. Finally, both m_r and m_t are increasing in the number of tourists; therefore, even when residents and tourists consume different goods, tourism still increases consumption amenities for residents. The reason is that tourism makes residents richer via increased land income, and therefore raises their aggregate consumption demand.

What are the implications for welfare? Although the effect on consumption amenities is milder for residents, the welfare impact of tourism is always positive for them. In fact, as we argued in the discussion of proposition 2, the mere increase in land prices is enough to make residents better off (on average). Conversely, since the effect of consumption amenities is stronger for tourists, the impact of tourism on their own welfare becomes more favorable. Specifically, when the love of variety effect is strong $\varepsilon < \varepsilon$, the welfare effect is always positive, like in the baseline case; however, even when the love of variety effect is weak $\varepsilon \geq \varepsilon$, tourism may have a positive effect on the welfare of tourists. This happens when:

$$
n_T I_T < \frac{\gamma(1-\varepsilon)}{\varepsilon - \gamma(1-\beta_s\varepsilon)} a_k n_R,
$$

that is, when the number of tourists is low relative to the number of residents.

6.3 High substitutability between labor and intermediate inputs

In this section, we develop a simple extension of the production function in the services sector, such that the elasticity of substitution between labor and the intermediate input can be greater than one. Under partial specialization, this mechanism implies that it takes a larger number of tourists for cities to reach full specialization. Under full specialization, it flattens the slope of wages with respect to tourism, as firms have more leverage to substitute away labor for the intermediate input. These results reinforce our conclusion that the partial specialization scenario is the most relevant to analyze: beforehand we made this point on empirical grounds, given that full specialization is hard to observe in the real worlds - we now add a theoretical argument.

In practice, we assume that labor and the intermediate input are combined according to a CES structure, with elasticity of substitution $\theta \geq 1$; this structure is then nested into a Cobb-Douglas production function that includes land. Therefore, all the results that follow subsume our baseline results as a special case in which $\theta = 1$.

Formally, let the production function for the non-tradable good be:

$$y_s = a_s h_s^{\beta_s} \left[(\alpha_s)^{\frac{1}{\theta}} l_s^{\frac{\theta-1}{\theta}} + (1 - \alpha_s - \beta_s)^{\frac{1}{\theta}} y_k^{\frac{\theta-1}{\theta}} \right]^{\frac{\theta}{\theta-1}(1-\beta_s)}, \quad \theta \geq 1,$$

while the production function for the intermediate good is the same as in the baseline case. This formulation nests the baseline Cobb-Douglas case for $\theta = 1$. Also, note that we have already dropped the subscript j, given that all firms are symmetric. Combining the first-order conditions for l_s and y_k, and summing over all firms we obtain:

$$wL_s = \frac{\alpha_s}{(1 - \alpha_s - \beta_s)} w^{1-\theta} Y_k.$$

Using the market clearing condition for the intermediate good and for labor, and repeating the same steps as in section 3.3, we can write:

$$wL_s = \frac{\alpha_s w^{1-\theta}}{\alpha_s w^{1-\theta} + (1 - \alpha_s - \beta_s)} (wn_R + n_T I_T - m\eta).$$

Finally, using the zero profit condition, we get:

$$wL_s = \frac{\varepsilon(1 - \beta_s)}{1 - \beta_s \varepsilon} \Theta(w)(wn_R + n_T I_T). \tag{24}$$

where we define $\Theta(w) = \frac{\alpha_s w^{1-\theta}}{\alpha_s w^{1-\theta} + (1-\alpha_s-\beta_s)}$. This expression is a generalization of equation (13). In the case of partial specialization, where the wage is pinned down in the intermediate sector ($w = a_k$), the share of residents employed in services still increases linearly with the number of tourists. However, given that $\Theta(w) < 1$, the slope of $\frac{L_s}{n_R}$ with respect to n_T is now flatter. As a result, the threshold $\hat{n}_T$ is also larger than in the baseline case. In particular, it is possible to show that $\hat{n}_T$ is increasing in θ, and tends to infinity as $\theta \to \infty$. Thus, the scope of partial specialization increases the more substitutable are labor and the intermediate input.

Suppose, however, that the city reaches full specialization. In this case, $L_s = n_R$, and (24) can be written as:

$$w = \frac{(1-\beta_s)\varepsilon\Theta(w)}{1-\beta_s\varepsilon-(1-\beta_s)\varepsilon\Theta(w)}\frac{n_T I_T}{n_R},$$

Using the implicit function theorem, and after some calculations, it is possible to show that:

$$\left[1-\frac{\varepsilon(1-\beta_s)(1-\beta_s\varepsilon)}{[1-\beta_s\varepsilon-(1-\beta_s)\varepsilon\Theta(w)]^2}\frac{\partial\Theta(w)}{\partial w}\right]dw = \Theta(w)dn_T.$$

Given that $\frac{\partial\Theta(w)}{\partial w} < 0$ it is easy to check that the elasticity of wages with respect to tourism $\frac{dw}{dn_T}\frac{n_T}{w}$ is always lower than 1 (in contrast with the baseline case) and decreasing in θ. Finally, since $\lim_{\theta\to\infty}\frac{\partial\Theta(w)}{\partial w} = -\infty$, it follows that $\lim_{\theta\to\infty}\frac{dw}{dn_T}\frac{n_T}{w} = 0$: the elasticity of the wage rate with respect to the number of tourism goes to zero for $\theta \to \infty$.

In conclusion, in our baseline model, tourism leads cities to specialize in the services sector, and, after full specialization, wages rise linearly with the number of tourists. In a world where labor and intermediate inputs are highly substitutable, these results are substantially weakened, while the importance of partial specialization is reinforced.

7 Conclusions

In this paper we have shown that the number of firms and employment in non-tradable service industries that are related to consumption amenities react to the inflow of tourists at the city level in Italy. We then set up a general equilibrium model of small open cities that are a tourist destination to study the impact of tourism on endogenous amenities, factors' allocations across sectors, prices, and welfare. The model yields predictions consistent with the observed pattern in the data about the relationship between tourism, amenities and factors' allocations, and it brings new normative implications concerning tourism and residents' welfare.

An interesting message of our paper is that tourism may create winners and losers in the resident population, and may increase inequality. The mechanism goes through an unequal distribution of land across residents. In what we call the partial specialization scenario, residents endowed with little land suffer from the increase in prices that tourism brings about.

This paper contributes to the literature about the emergence and the role of urban consumption amenities, and to the literature about the economic consequences of tourism, which is a fast-growing sector all over the world. An interesting direction for future research would be to widen the empirical analysis, by examining the reaction of prices to tourism, and by thoroughly investigating the causal link between tourism and the endogenous variables of our model.

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8 Appendix

8.1 Description of the main variables used in the empirical analysis

Tourism. Our data provide the total number of overnight stays in tourist accommodation establishments at the province level and the total number of beds in tourist accommodation establishments at the municipality level - a measure of capacity. We compute the share of beds in each municipality over its province total; then, we allocate overnight stays to each municipality based on this capacity weight. Finally, we divide the number of overnight stays by 365: in this way, we construct a "resident-equivalent" measure of the number of tourists. Source: *Annual Survey of Capacity of Tourist Accommodation Establishments* (Istat), years 2001 and 2011.

Resident population. The resident population is taken from Census, and it is expressed in thousands of units. Source: *Population Census* (Istat), years 2001 and 2011.

Establishments. Hotels per 1000 residents is the total number of local units in the tourist accommodation sector (therefore, it includes hostels, campings, etc.) divided by the resident population expressed in thousands. Restaurants and bars per 1000 residents is the total number of local units in the restaurants and food services sector (therefore, it includes hostels, campings, etc.) divided by the resident population expressed in thousands. Retail shops per 1000 residents is the total number of local units in the retail shop sector (therefore, it includes hostels, campings, etc.) divided by the resident population expressed in thousands. Source: *Industry and Services Census* (Istat), years 2001 and 2011.

Labor force. The share of labor force in the retail services sector is the sum of the number of workers employed in the tourist accommodation sector, in the restaurant and food services sector, and in the retail shop sector, divided by the total number of workers employed in the municipality. Source: *Industry and Services Census* (Istat), years 2001 and 2011.

8.2 Exact values of the constants

In this section we report the exact value of all the constants used in the paper.

$$\begin{aligned} \kappa_s &= \alpha_s^{\alpha_s}\beta_s^{\beta_s}(1-\alpha_s-\beta_s)^{(1-\alpha_s-\beta_s)}, & \kappa_w^F &= \frac{\alpha_s\varepsilon}{1-(\alpha_s+\beta_s)\varepsilon} \\ \kappa_m^P &= \frac{1-\varepsilon}{1-\beta_s\varepsilon}, & \kappa_m^F &= \frac{1-\varepsilon}{1-(\alpha_s+\beta_s)\varepsilon} \\ \kappa_q^P &= \frac{1-\gamma+\beta_s\varepsilon\gamma}{\gamma(1-\beta_s\varepsilon)}, & \kappa_q^F &= \frac{1-\gamma+\beta_s\varepsilon\gamma}{\gamma[1-(\alpha_s+\beta_s)\varepsilon]} \end{aligned}$$

8.3 Analytical derivation of the equilibrium

8.3.1 Optimal price p_s

Rewrite the first order conditions in the non-tradable sector (5) as:

$$\begin{aligned} l_{sj} &= \tfrac{\alpha_s}{1-\alpha_s-\beta_s}\tfrac{y_k}{w}, \\ h_{sj} &= \tfrac{\beta_s}{1-\alpha_s-\beta_s}\tfrac{y_k}{q}, \\ p_{sj} &= \tfrac{1}{\varepsilon(1-\alpha_s-\beta_s)}\tfrac{y_{kj}^{\alpha+\beta}}{a_s l_s^{\alpha_s} h_s^{\beta_s}}, \end{aligned} \tag{25}$$

where we have divided the first and the second condition by the third, and rearranged the third in terms of p_{sj}. Now plug the first and the second equation into the third of (25) to obtain $p_s = \frac{w^{\alpha_s} q^{\beta_s}}{\varepsilon \kappa_s a_s}$.

8.3.2 Current account balance equation

As a preliminary step, not that total consumer expenditure can be expressed as $n_R I_R$, because the wage is equalized in the two sectors and the labor market clears - equation (10). With this in mind, plug the first order conditions for consumers (1) into the market clearing conditions for the non-tradable (8) and the land (9) markets.

$$\begin{aligned} \gamma w n_R + \gamma q H + \gamma n_T I_T &= m p_s y_s \\ (1-\gamma) w n_R + (1-\gamma) q H + (1-\gamma) n_T I_T + q m h_S &= qH \end{aligned}$$

Then, use the zero profit condition in the first equation ($p_s y_s = w l_s + q h_s + y_k + \eta$), and sum the two equations to get:

$$w n_R + qH + n_T I_T + q m h_S = w m l_s + q m h_s + m y_k + m\eta + qH,$$

where we expressed the firm variables on the right-hand side in aggregate terms. Note that the qH_s and the qH terms cancel out. Now, plug into this expression the market clearing condition for the intermediate input (11):

$$w n_R + n_T I_T = w m l_s + Y_k^o + X.$$

Finally, plug in the zero profit condition in the $Y_k^o = wL_k$ and note that $w(ml_s + L_K)$ cancels out with wn_R on the left-hand side by labour market clearing. We are left with:

$$n_T I_T = X.$$

8.4 Proofs of propositions

8.4.1 Proof of proposition 2

Substitute the wage rate (14), the land price (16), and the price of non-tradable services (17) into the expression for V_R given by equation (2). For $n_T < \hat{n}_T$, we obtain:

$$V_R = \frac{K}{n_R} \frac{(1+\kappa_q^P) a_k n_R + \kappa_q^P n_T I_T}{(a_k n_R + n_T I_T)^{1-\gamma+\beta_s\gamma} - \frac{\gamma(1-\varepsilon)}{\varepsilon}}$$

where $K \equiv (\frac{\kappa_m^P}{\eta})^{\frac{\gamma(1-\varepsilon)}{\varepsilon}} \frac{(\varepsilon\kappa_s)^\gamma}{(\kappa_q^P)^{1-\gamma+\beta_s\gamma}} \frac{a_s^\gamma H^{1-\gamma+\beta_s\gamma}}{a_k^{\alpha_s\gamma}}$. The numerator of this expression derives from the nominal income of residents as a function of tourists, whereas the denominator combines the land price component $(1-\gamma+\beta_s\gamma)$ and the love of variety component $(\frac{\gamma(1-\varepsilon)}{\varepsilon})$. Note that land price has a direct effect on the price level $(1-\gamma)$ and an indirect effect, since it is part of the marginal cost for firms in the services sector $(\beta_s\gamma)$. Take the derivative with respect to n_T:

$$\frac{\partial V_R}{\partial n_T} = \frac{K I_T}{n_R (a_k n_R + n_T I_T)^{2-\gamma+\beta_s\gamma-\frac{\gamma(1-\varepsilon)}{\varepsilon}}} \times$$
$$\left\{ \kappa_q^P (a_k n_R + n_T I_T) - \left[1 - \gamma + \beta_s\gamma - \frac{\gamma(1-\varepsilon)}{\varepsilon}\right] [(1+\kappa_q^P) a_k n_R + \kappa_q^P n_T I_T] \right\}.$$

Collect terms:

$$\frac{\partial V_R}{\partial n_T} = \frac{K I_T}{n_R (a_k n_R + n_T I_T)^{2-\gamma+\beta_s\gamma-\frac{\gamma(1-\varepsilon)}{\varepsilon}}} \times$$
$$\left\{ \left(\gamma(1-\beta_s) + \frac{\gamma(1-\varepsilon)}{\varepsilon}\right) \kappa_q^P n_T I_T + \left[\kappa_q^P - \left(1 - \gamma + \beta_s\gamma - \frac{\gamma(1-\varepsilon)}{\varepsilon}\right)(1+\kappa_q^P)\right] a_k n_R \right\}.$$

Now plug in the expression for κ_q^P and do the remaining simplifications:

$$\frac{\partial V_R}{\partial n_T} = \frac{K I_T}{n_R (a_k n_R + n_T I_T)^{2-\gamma+\beta_s\gamma} - \frac{\gamma(1-\varepsilon)}{\varepsilon}} \left\{ \frac{1-\gamma+\beta_s\gamma\varepsilon}{\varepsilon} n_T I_T + \frac{(1-\varepsilon)}{\varepsilon} a_k n_R \right\},$$

which is always positive.

Under full specialization, $n_T \geq \hat{n}_T$, the welfare of residents is:

$$V_R = \left(\frac{\kappa_m^F}{\eta}\right)^{\frac{\gamma(1-\varepsilon)}{\varepsilon}} \cdot \frac{(\kappa_w^F + \kappa_q^F)(\varepsilon\kappa_s a_s)^\gamma}{(\kappa_w^F)^{\gamma\alpha_s}(\kappa_q^F)^{1-\gamma+\beta_s\gamma}} \frac{H^{1-\gamma+\beta_s\gamma}}{n_R^{1-\alpha_s\gamma}} (n_T I_T)^{\gamma(1-\alpha_s-\beta_s)+\frac{\gamma(1-\varepsilon)}{\varepsilon}},$$

which is clearly increasing in n_T.

8.4.2 Proof of proposition 3

Substitute the equilibrium expressions for the number of firms (15), the land price (16), and the price of non-tradables (17) into the indirect utility of tourists (3). For $n_T < \hat{n}_T$, we get:

$$V_T = K A_T I_T (a_k n_R + n_T I_T)^{\frac{\gamma(1-\varepsilon)}{\varepsilon} - (1-\gamma+\beta_s\gamma)},$$

where K is a constant term, as defined above. The partial derivative with respect to the number of tourists can be written as:

$$\frac{\partial V_T}{\partial n_T} = \left[\frac{\gamma(1-\varepsilon)}{\varepsilon} - (1-\gamma+\beta_s\gamma)\right] \frac{V_T}{a_k n_R + n_T I_T}.$$

This expression is greater than zero for $\varepsilon < \frac{\gamma}{1+\beta_s\gamma}$. This proves the proposition under the case of partial specialization.

For $n_T \geq \hat{n}_T$, we get:

$$V_T = \frac{(\varepsilon\kappa_s)^\gamma (\kappa_m^F)^{\frac{\gamma(1-\varepsilon)}{\varepsilon}}}{(\kappa_w^F)^{\alpha_s\gamma}(\kappa_q^F)^{1-\gamma+\beta_s\gamma}} \frac{A a_s^\gamma n_R^{\alpha_s\gamma} H^{1-\gamma+\beta_s\gamma} I_T}{\eta^{\frac{\gamma(1-\varepsilon)}{\varepsilon}}} (n_T I_T)^{\frac{\gamma(1-\varepsilon)}{\varepsilon} - [1-\gamma(1-\alpha_s-\beta_s)]},$$

whose partial derivative with respect to the number of tourists can be written as:

$$\frac{\partial V_T}{\partial n_T} = \left[\frac{\gamma(1-\varepsilon)}{\varepsilon} - 1 + \gamma(1-\alpha_s-\beta_s)\right] \frac{V_T}{n_T}.$$

This expression is greater than zero for: $\varepsilon < \frac{\gamma}{1+\gamma(\alpha_s+\beta_s)}$. This proves the proposition under the case of full specialization.

8.4.3 Proof of proposition 4

When $n_T < \hat{n}_T$, real income for resident i is:

$$\tilde{I}_{Ri} = \frac{(\varepsilon\kappa_s a_s)^\gamma}{(\kappa_q^P)^{1-\gamma+\beta_s\gamma}} \frac{H^{1-\gamma+\beta_s\gamma}}{a_k^{\alpha_s\gamma}} \frac{a_k + \kappa_q^P (a_k n_R + n_T I_T)\frac{H_i}{H}}{(a_k n_R + n_T I_T)^{1-\gamma+\beta_s\gamma}}.$$

To prove the first part of the proposition, write the real income ratio as:

$$\frac{\tilde{I}_{Ri'}}{\tilde{I}_{Ri}} = \frac{a_K + \kappa_q^P (a_K n_R + n_T I_T)\frac{H_{i'}}{H}}{a_K + \kappa_q^P (a_K n_R + n_T I_T)\frac{H_i}{H}},$$

which is increasing in n_T for $H_{i'} > H_i$.

Let us turn to the second part of the proposition. Welfare for resident i is:

$$V_{Ri} = K \frac{a_k + \kappa_q^P (a_k n_R + n_T I_T)\frac{H_i}{H}}{(a_k n_R + n_T I_T)^{1-\gamma+\beta_s\gamma - \frac{\gamma(1-\varepsilon)}{\varepsilon}}},$$

where K is a constant term, as defined above. Taking the derivative with respect to n_T:

$$\frac{\partial V_{Ri}}{\partial n_T} = \frac{K I_T}{(a_k n_R + n_T I_T)^{1+\frac{\varepsilon-\gamma+\beta_s\gamma\varepsilon}{\varepsilon}}} \left\{ \kappa_q^P \frac{H_i}{H}(a_k n_R + n_T I_T) - \frac{\varepsilon - \gamma + \beta_s \gamma \varepsilon}{\varepsilon} \left[a_k + \kappa_q^P (a_k n_R + n_T I_T) \frac{H_i}{H} \right] \right\}.$$

In the curly brackets, collect the $\frac{H_i}{H}$ terms:

$$\frac{\partial V_{Ri}}{\partial n_T} = \frac{K I_T}{(a_k n_R + n_T I_T)^{1+\frac{\varepsilon-\gamma+\beta_s\gamma\varepsilon}{\varepsilon}}} \left[\frac{\gamma(1-\beta_s\varepsilon)}{\varepsilon} \kappa_q^P (a_k n_R + n_T I_T) \frac{H_i}{H} - \frac{\varepsilon - \gamma + \beta_s\gamma\varepsilon}{\varepsilon} a_k \right].$$

The derivative is positive whenever the term in curly brackets is positive; that is, for

$$\frac{H_i}{H} > \frac{\varepsilon - \gamma + \beta_s\gamma\varepsilon}{1 - \gamma + \beta_s\gamma\varepsilon} \frac{a_k}{a_k n_R + n_T I_T},$$

where we have already substituted the expression for κ_q^P.

8.4.4 Proof of proposition 5

When $n_T \geq \hat{n}_T$, real income for resident i is:

$$\tilde{I}_{Ri} = \frac{(\varepsilon \kappa_s a_s)^\gamma}{(\kappa_w^F)^{\gamma\alpha_s} (\kappa_q^F)^{1-\gamma+\beta_s\gamma}} n_R^{\alpha_s\gamma} H^{1-\gamma+\beta_s\gamma} \left(\frac{\kappa_w^F}{n_R} + \frac{\kappa_q^F H_i}{H} \right) (n_T I_T)^{\gamma(1-\alpha_s-\beta_s)}.$$

It is easy to see that this expression is increasing in n_T for all H_i, which proves the second part of the proposition. The real income ratio for any two pair of residents $\{i, i'\}$, is:

$$\frac{\tilde{I}_{Ri'}}{\tilde{I}_{Ri}} = \left(\frac{\frac{\kappa_w^F}{n_R} + \frac{\kappa_q^F H_{i'}}{H}}{\frac{\kappa_w^F}{n_R} + \frac{\kappa_q^F H_i}{H}} \right),$$

which is independent of the number of tourists. This proves the first part of the proposition.

8.5 Spatial equilibrium with full specialization

When $\varepsilon < \widehat{\varepsilon}_P$ and $\widehat{\varepsilon}_F > \varepsilon$, the properties of the spatial equilibrium derived in section 5 still hold. In fact, when $\varepsilon < \widehat{\varepsilon}_P$, tourist welfare is monotonically decreasing in the number of tourists, be the city fully or partially specialized. Therefore, provided an interior equilibrium exists, it will be unique, and still given by $V_{T,1}(\phi) = V_{T,2}(\phi)$. If either one or both cities specialize in the services sector, tourist welfare takes a different expression and, as a result, the expression for the equilibrium ϕ will differ from the (see 21).

Similarly, when $\widehat{\varepsilon}_F > \varepsilon$, tourist welfare is monotonically increasing in the number of tourists under both scenarios. Therefore, if an interior equilibrium exists, it is unstable, and the only stable equilibria entail full concentration of tourists in one of the two cities. Suppose a tourist hub emerges in city 1, with $N_T > \widehat{n}_{T,1}$. Then, city 1 fully specializes in the services sector, whereas city 2, with no tourists, remains partially specialized.

Case where $\widehat{\varepsilon}_F < \varepsilon < \widehat{\varepsilon}_P$ (moderate consumption amenity)

A more complicated case arises when $\widehat{\varepsilon}_F < \varepsilon < \widehat{\varepsilon}_P$. In this case, tourist welfare is non-monotonic in the number of tourists: it increases with n_T under partial specialization and decreases with n_T under full specialization.

First, suppose that $N_T < min[\widehat{n}_{T,1}, \widehat{n}_{T,2}]$; in this case, full specialization never occurs, even if all tourists go to the same city. With partial specialization and $\varepsilon < \widehat{\varepsilon}_P$, this implies that the (stable) spatial equilibrium features the emergence of a tourist hub in one of the two cities, like in the case of highly differentiated product varieties.

Second, note that, for N_T large enough, the functions $V_{T,1}$ and $V_{T,2}$ only cross once in the downward-sloping part of the curve. Therefore there is a unique interior equilibrium that is also stable, like in the case of poorly differentiated varieties.

When N_T is in the intermediate range, given that the welfare functions are not monotonic, there can be multiple crossings. Unfortunately, the number of crossings, as well as the range itself, depend on the shape of the functions. In general, an interior stable equilibrium may coexist with tourist-hub equilibria in either one or both cities.

8.6 Different goods for residents and tourists: analytical derivations

First, we show that the total number of firms in the city, $m_r + m_T$ is still given by equation (15). The market clearing condition for the intermediate good is

$$m_r y_{kr} + m_t y_{kt} + (m_r + m_t)\eta = Y_k^o + X.$$

Using the first-order conditions from the firm's problem, we can rewrite the same condition in terms of labour

$$\frac{1-\alpha-\beta}{\alpha} wL_{sr} + \frac{1-\alpha-\beta}{\alpha} wL_{tr} + (m_r + m_t)\eta = wL_k + X.$$

Also note that the current account balance condition $X = n_T I_T$ still holds. Plugging this expression into the labour market clearing condition, $L_{Sr} + L_{St} + L_k = n_R$, we obtain:

$$w(L_{sr} + L_{st}) = \frac{\alpha_s}{1-\beta_s}(a_k n_R + n_T) - (m_r + m_t)\eta.$$

Finally, we need a condition to express the labour force in the resident and in the tourist non-tradable sector as a function of the number of firms. Since firms in both sectors make zero profits, we have: $wL_{sr} = \frac{\alpha\varepsilon}{1-\varepsilon} m_r \eta$ and $wL_{st} = \frac{\alpha\varepsilon}{1-\varepsilon} m_t \eta$, given optimal firm behavior. Doing the final substitution, we get:

$$m_r + m_t = \frac{1-\varepsilon}{1-\beta_s\varepsilon} \frac{wn_R + n_T I_T}{\eta},$$

which is the analogous of equation (15), and:

$$w(L_{sr} + L_{st}) = \frac{\alpha_s\varepsilon}{1-\beta_s\varepsilon} \frac{wn_R + n_T I_T}{\eta},$$

which is the analogous of equation (13). These expressions imply that, in aggregate terms, the model has the same equilibrium as in the baseline case, with $L_s = L_{sr} + L_{st}$ and $m = m_r + m_t$. We need only to calculate the factor allocation between the resident and the tourist non-tradable sectors. Let us turn to the demand side of the economy. In the resident sector, given that firms are symmetrical and prices are equalized between the resident and the tourist sector, we have

$$
\begin{aligned}
n_R c_R =& \frac{\gamma n_R I_R}{m_r p_s} && = y_{sr}, \\
n_T c_T =& \frac{\gamma n_T I_T}{m_t p_s} && = y_{st}
\end{aligned}
$$

where, in each expression, the first equality comes from the consumer's problem and the second equality is the market clearing condition. Then, since the size of the individual firm is the same in both sectors, it follows that $\frac{m_t}{m_r} = \frac{n_T I_T}{n_R I_R}$. As a last step, using the expression for $m_r + m_t$, we obtain:

$$
\begin{aligned}
m_r =& \frac{1-\varepsilon}{1-\beta_s \varepsilon} \frac{(1+\kappa_q^P) a_k n_R + \kappa_q^P n_T I_T}{(1+\kappa_q^P)\eta}, \\
m_t =& \frac{1-\varepsilon}{1-\beta_s \varepsilon} \frac{n_T I_T}{(1+\kappa_q^P)\eta}.
\end{aligned}
$$

Table 1: Descriptive statistics

	Obs	Mean	S.D.	Min	1st quartile	Median	3rd quartile	Max
Residents (1000)	7873	7.19	39.88	0.03	1.07	2.40	5.79	2546.80
Tourists per 1000 residents	7873	18.93	61.03	0.00	0.00	1.45	8.43	1471.81
Hotels, etc. per 1000 residents	7873	1.23	3.73	0.00	0.00	0.15	0.80	74.26
Restaurants and bars per 1000 residents	7873	4.45	3.65	0.00	2.61	3.57	5.09	79.21
Retail stores per 1000 residents	7873	9.87	5.12	0.00	6.63	9.27	12.28	97.97
Employment in hotels, etc. per 1000 residents	7873	3.79	10.98	0.00	0.00	0.35	2.67	257.09
Employment in restaurants and bars per 1000 residents	7873	10.36	10.17	0.00	4.90	7.87	12.56	196.60
Employment in retail stores per 1000 residents	7873	19.00	18.43	0.00	10.83	15.87	22.44	744.41
Land area (squared km)	7873	37.19	50.21	0.15	11.25	21.77	42.96	1307.71
Δ tourists per 1000 residents	7873	1.74	13.71	-87.77	0.00	0.57	3.15	89.27
Δ hotels per 1000 residents	7873	0.04	2.06	-39.04	-0.03	0.00	0.23	71.43
Δ restaurants and bars per 1000 residents	7873	0.86	2.36	-26.32	-0.03	0.75	1.59	55.18
Δ retail stores per 1000 residents	7873	-1.55	2.72	-29.41	-2.82	-1.54	-0.25	83.22
Δ employment in hotels, etc. per 1000 residents	7873	0.54	12.45	-182.84	-0.40	0.00	0.50	349.88
Δ employment in restaurants and bars per 1000 residents	7873	4.56	10.12	-147.62	0.78	3.63	6.84	223.78
Δ employment in retail stores per 1000 residents	7873	0.28	12.10	-134.42	-3.45	-0.38	2.69	474.48

Notes: The table provides descriptive statistics for the variables used in the regressions. The first set of variables shown are computed with respect to the year 2001. *Residents (1000)* is the number of residents at the city level expressed in thousands. *Tourists per 1000 residents* is the number of tourists normalized by the resident population expressed in thousands. We then report statistics for the total number of establishments and total employment normalized by thousands of residents at the municipality level for some NACE Rev. 2 industries: *Hotels, etc.* is industry 55, *Restaurants and bars* is industry 56, *Retail stores* is the sum of 3-digit industries 471, 472, 475, 476, 477. *Land area* is total urban land area. In the bottom part of the table, we report the change between 2001 and 2011 for the same set of variables.

Table 2: Tourism and number of establishments

	Restaurant and bars	Retail trade						Accommodation
		All	Non-spec. stores	Food, beverages	Household equip.	Books, sport, toys	Clothing, footwear	
NACE Rev. 2	56		471	472	475	476	477	55
				Panel A: All municipalities				
Δ tourism	0.018***	0.013***	-0.002	0.003**	0.001	0.003**	0.008***	0.038***
	(0.004)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.005)
R^2	0.057	0.051	0.032	0.032	0.035	0.048	0.053	0.216
Obs.	7,873	7,873	7,873	7,873	7,873	7,873	7,873	7,873
				Panel B: Without top decile of 2001 tourist density municipalities				
Δ tourism	0.025***	0.017***	-0.004	0.005**	0.001	0.003***	0.012***	0.046***
	(0.006)	(0.005)	(0.003)	(0.002)	(0.002)	(0.001)	(0.003)	(0.006)
R^2	0.049	0.053	0.038	0.035	0.038	0.021	0.048	0.169
Obs.	7,216	7,216	7,216	7,216	7,216	7,216	7,216	7,216
				Panel C: Without municipalities with zero tourist density in either 2001 or 2011				
Δ tourism	0.018***	0.012***	-0.001	0.002	0.001	0.003*	0.007***	0.037***
	(0.004)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.005)
R^2	0.072	0.077	0.040	0.041	0.049	0.071	0.079	0.226
Obs.	4,951	4,951	4,951	4,951	4,951	4,951	4,951	4,951

Notes: In all columns, the dependent variable is the change in the number of establishments per 1000 residents between 2001 and 2011. Each column represents a different industry. In panel A we use the full sample of municipalities; in panel B we exclude the municipalities in the top decile of the tourists per 1000 residents distribution in 2001; in panel C we exclude municipalities with zero tourist density in either 2001 or 2011. All regressions include as controls total municipal land area, average elevation, a dummy variable for coastal towns, and dummy variables for each province. ***,**,* denote significance at the 1%, 5%, 10% level, respectively. Robust standard errors are reported in parenthesis.

Table 3: Tourism and employment

	Restaurant and bars	Retail trade						Accommodation
		All	Non-spec. stores	Food, beverages	Household equip.	Books, sport, toys	Clothing, footwear	
NACE Rev. 2	56		471	472	475	476	477	55
Panel A: All municipalities								
Δ tourism	0.048***	0.026***	0.000	0.004	-0.001	0.007**	0.016***	0.117***
	(0.016)	(0.009)	(0.006)	(0.003)	(0.003)	(0.003)	(0.005)	(0.029)
R^2	0.088	0.023	0.013	0.033	0.017	0.036	0.017	0.121
Obs.	7,873	7,873	7,873	7,873	7,873	7,873	7,873	7,873
Panel B: Without top decile of 2001 tourist density municipalities								
Δ tourism	0.063***	0.015	-0.011	0.001	-0.004	0.006	0.024**	0.110***
	(0.017)	(0.018)	(0.013)	(0.004)	(0.005)	(0.004)	(0.011)	(0.016)
R^2	0.038	0.022	0.015	0.034	0.018	0.014	0.017	0.064
Obs.	7,216	7,216	7,216	7,216	7,216	7,216	7,216	7,216
Panel C: Without municipalities with zero tourist density in either 2001 or 2011								
Δ tourism	0.041**	0.023***	0.001	0.004	0.001	0.006*	0.011**	0.117***
	(0.018)	(0.009)	(0.005)	(0.004)	(0.002)	(0.003)	(0.004)	(0.032)
R^2	0.112	0.046	0.023	0.044	0.028	0.057	0.033	0.149
Obs.	4,952	4,952	4,952	4,952	4,952	4,952	4,952	4,952

Notes: In all columns, the dependent variable is the change in employment per 1000 residents between 2001 and 2011. Each column represents a different industry. In panel A we use the full sample of municipalities; in panel B we exclude the municipalities in the top decile of the tourists per 1000 residents distribution in 2001; in panel C we exclude municipalities with zero tourist density in either 2001 or 2011. All regressions include as controls total municipal land area, average elevation, a dummy variable for coastal towns, and dummy variables for each province. ***,**,* denote significance at the 1%, 5%, 10% level, respectively. Robust standard errors are reported in parenthesis.

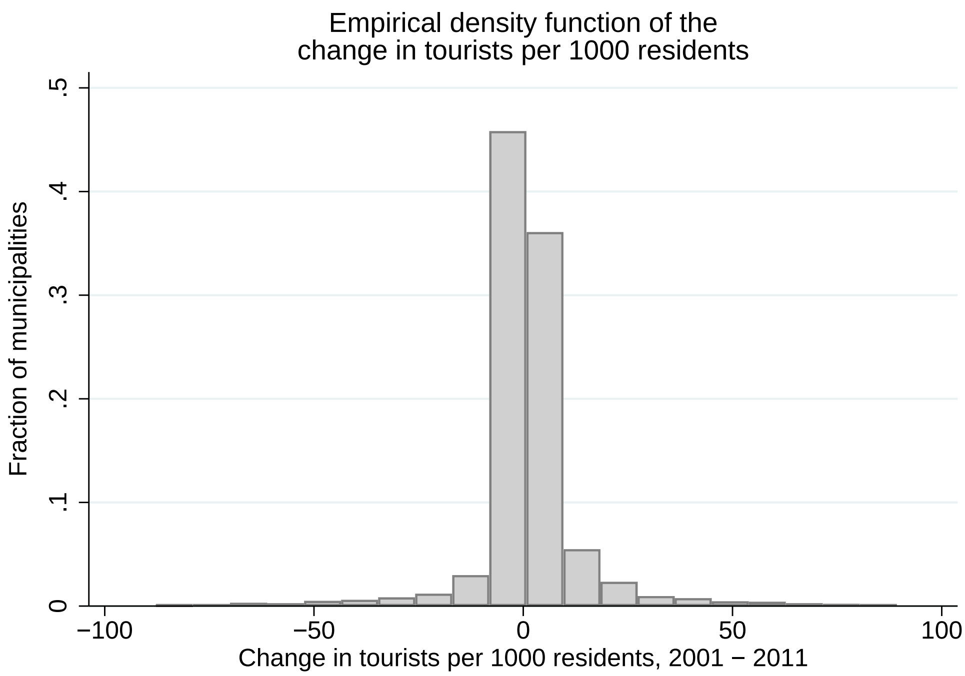


Figure 1: The figure plots the empirical density function of the change in the number of tourists (in terms of resident-equivalent) per 1000 residents over the period 2001 – 2011, after having dropped municipalities at the top 1% and bottom 1% of the distribution.

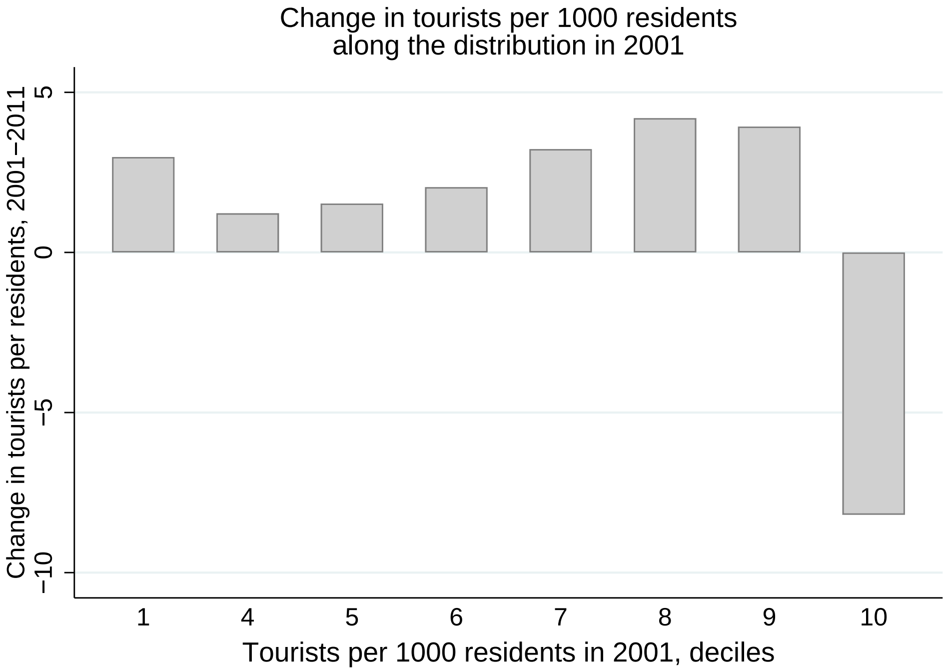
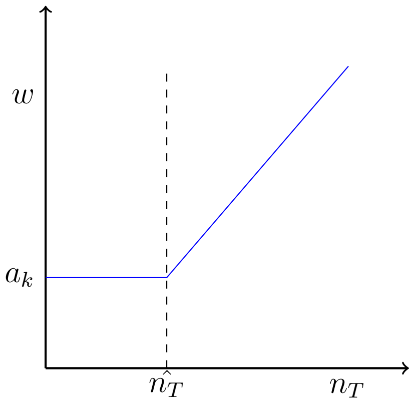
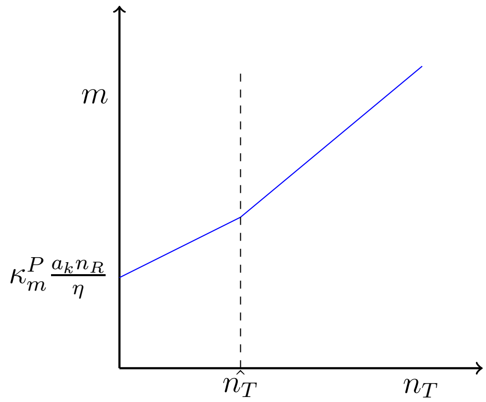


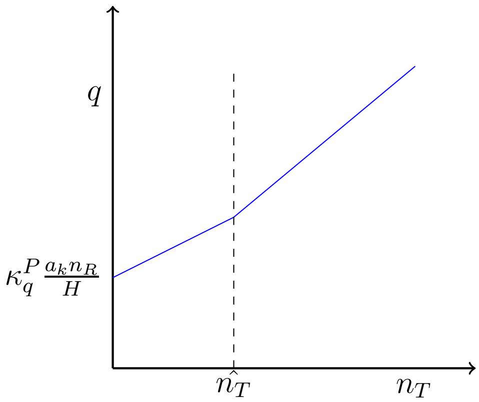
Figure 2: The figure plots the average change in the number of tourists (in terms of resident-equivalent) per 1000 residents over the period 2001 – 2011. Municipalities are ranked in terms of deciles of the distribution of the number of tourists per residents in 2001.



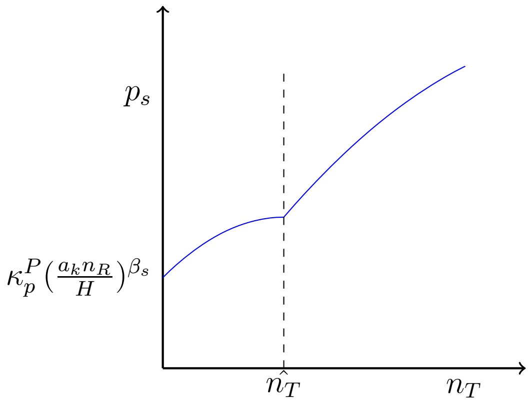
(a) Wage rate



(b) Number of firms in the non-tradable sector



(c) Land price



(d) Price of non-tradable good

Figure 3: Endogenous variables at the baseline equilibrium

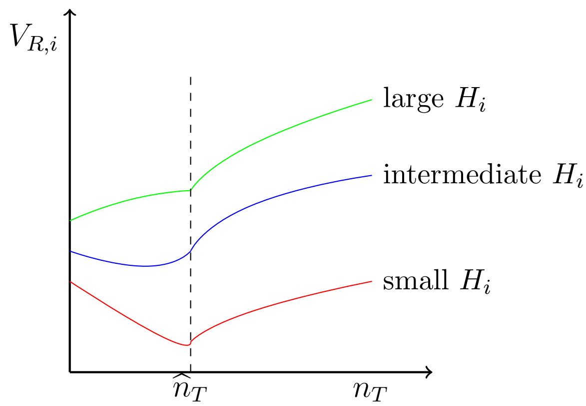
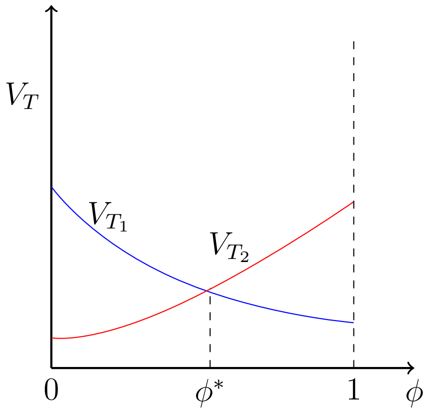
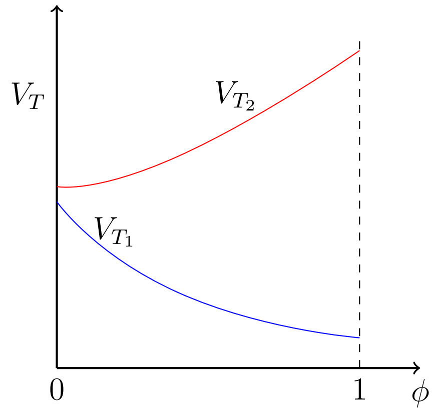


Figure 4: Inequal welfare effects of tourism according to the residents' land endowments



(a) The interior equilibrium



(b) Equilibrium with a tourist hub in city 2

Figure 5: The spatial equilibrium with weak consumption amenities

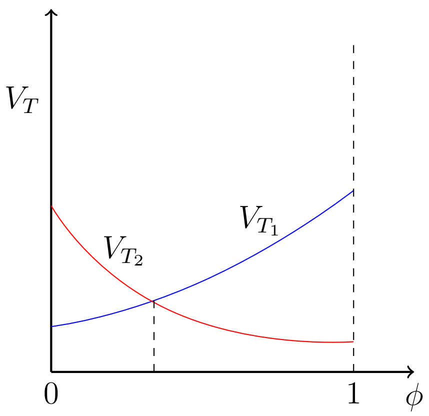


Figure 6: The spatial equilibrium with strong consumption amenities

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