

# “Dutch Disease in a Gaming Tourism Economy: The case of Macau”

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**Abstract.** Under a framework where 2002’s change in gaming legislation (i.e., gaming liberalization) is regarded as the trigger for the gaming tourism boom in Macau, we econometrically tested the impact of selected gaming tourism indicators on domestic exports of goods and assessed the presence of the Dutch Disease phenomenon in Macau, effectively linking this concept with the territory’s economic reality. Still, in our view, *suffering* from the Dutch Disease should only represent a serious economic problem to Macau if the territory loses its gaming privileged position. Therefore, we consider that priority should be given to applying gaming tourism revenues in investments that aim the creation of lasting value in this region and contribute to its sustainable development, such as education and health.

**Keywords:** Dutch Disease, Gaming Tourism, Macau

## 1. Introduction

After 2002, with the end of the monopoly gambling rights that had been granted until that moment to STDM (“Sociedade de Turismo e Diversões de Macau”) and with the subsequent arrival of new operators into this business as well as with the growth of the former monopolist, Macau dived into a new gaming tourism (GT) era, experiencing a boom in its GT sector. On the one hand, this new phase was marked by the entry on the scene of Western hotel and casino operators, particularly evident after 2004, when *Venetian Macao* (a casino owned by Las Vegas Sands Corp.) opened its doors to the public. As a result, the number of casinos went from 11 in 2002 to 15 in 2004, and to 34 in 2011 [2]; and, the stock of Inward Direct Investment in Gaming, Hotels and Restaurants, adjusted by Macau’s Gross Domestic Product (GDP) implicit price deflator (year 2010=100), grew 193% from 2002 to 2010 (data sources: [3, 5]).

On the other hand, in 2003, the Chinese central government removed existing barriers between Macau and Mainland China by introducing the “Free Travel Scheme” (or “Individual Visit” scheme – IVS), allowing individual visitors from a number of cities in Mainland China to travel to Macau (and to Hong Kong), and thus bringing an increasing number of visitors to Macau [9]. The number of total visitor arrivals grew 45% from 2002 to 2004, and 68% between 2004 and 2011. During this last period (2004-2011) the average weight of the visitors travelling to Macau under the IVS on total visitors to Macau was almost 25%, evidencing the importance of the IVS implementation in the territory’s GT increased demand (data sources:[6,7]). Yet, the contribution of inbound visitors to the expansion of Macau’s GT demand resides in their spending in the territory. Effectively, Macau’s exports of services resulting from the expenditure of non-residents in the domestic market, in chained (2010) dollars, grew 66% between 2002 and 2004, and 245% from 2004 to 2011(data source: [5]).

Both these shocks in supply and demand of GT services characterize, in our view, the GT boom in Macau, which brought into the territory considerable flows of foreign currency through Foreign Direct Investment (FDI) and GT revenues. The additional inflow of foreign currency experienced by a country is often related, in economic literature, with both the appreciation of that territory’s real exchange rate and the deindustrialization of its economy. This phenomenon is usually known as the Dutch Disease (DD).

## 2. Symptoms of the Dutch Disease in Macau

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Traditionally, the DD associates a country's increase of foreign currency with soaring revenues from its exports of natural resources, after discovering a new natural resource ("resource boom") or new applications for the existing ones. In addition, this currency inflow can also be sourced by FDI, foreign aid [8] or even GT revenues, as it is proposed in this paper. Presently, the GT sector is a major pillar of Macau's economy with the exports of services resulting from the expenditure of non-residents in the domestic market representing more than 105% of Macau's GDP (data source:[5]). Simultaneously, Macau has also been showing signs of a declining manufacturing sector as the share of manufacturing production in total GDP went from almost 10% in 2000 to less than 1% in 2010 (data source:[6]). As Macau started showing some symptoms of the DD, this paper aims to corroborate this suspicion by performing an empirical assessment of that economic phenomenon in the territory, substantiating as well our preliminary findings about the DD's existence in Macau [13]. As the sustainability of Macau's GT dependence has been in the center of local concerns, identifying accurately the underlying economic phenomenon should contribute to an understating of the expected accompanying long term effects and, most of all, to design an appropriate strategy to downsize the potential adverse outcomes.

### **3. Dutch Disease Background**

#### **3.1. Reference Literature: The Core Model**

Corden and Neary [1] presented what came to be recognized as the "core model" of the DD economics. The two authors considered a framework of a small open economy producing two tradable goods and one non-tradable (NT) good, where the two tradable goods consisted of a booming and a lagging good (usually, manufacturing). This model also considered that the price of the two tradable goods was exogenously given by international markets, and that the NT good's price was determined domestically by supply and demand.

Given this framework, Corden and Neary [1] asserted that a resource boom in a small open economy should origin two effects: the resource movement effect (RME) and the spending effect (SE). The RME occurs when, after the resource boom, the marginal product of labor rises in the booming sector, and there is a shift in labor into this sector from the other two remaining sectors. This shift has two major consequences: a contraction of the lagging sector ("direct deindustrialization") and excess demand for NT goods, which promotes an increase in the price of this type of goods (i.e., real appreciation, given that the two tradable goods' prices are assumed to be internationally determined). The SE arises when part of the domestic extra income, resulting from the resource boom, is spent and thus raises the relative price of the NT goods (real appreciation). As a consequence, there will be a shift in labor to the NT sector and further contraction of the lagging sector ("indirect deindustrialization"). In summary, it is possible to establish the following unambiguous DD symptoms: real exchange rate's appreciation and decrease in the lagging sector's labor and output, that is, deindustrialization, which unquestionably implies a decrease in that sector's exports [16].

#### **3.2. Recent Literature about Macau**

As a result of the GT boom, the concern about the potential presence of the DD in Macau arose. While this territory has been exhibiting some DD symptoms (namely, deindustrialization signs) for the past years, not until very recently the association of this economic phenomenon with Macau's GT reality has been noticed in newly published literature, such as [17] or [18]. Besides, we are only aware of one study ([12]), prior to our preliminary results ([13]), where the DD's detection in Macau was given considerable attention. That study ([12]), which was based on an earlier work of one of the authors ([11]), concluded that Macau showed some symptoms of the DD caused by the gaming boom. Yet, the empirical results derived weren't totally consistent with the theoretical propositions of the same study. Therefore, supplementary empirical evidence using a different approach and estimation method, a longer data span, and alternative variables seems imperative in order to assess the effective presence of the DD in Macau. The diagnosis of the DD in Macau is the subsequent required step to evaluate the potential long term effects for Macau's economy and, thus, contribute insightfully to the discussion about Macau's sustainability.

### **4. An Empirical Model for the Dutch Disease in Macau**

#### **4.1. Framework and Hypotheses**

In line with Corden and Neary's [1] work, we adopted a framework of a small open economy divided into three distinct sectors: a NT sector (Services) and two tradable sectors (GT and Manufacturing – booming and lagging, respectively). Considering the GT boom, characterized by a surge of foreign currency inflow resulting from both shocks in supply and demand of GT, and given the unambiguous combined outcomes of the RME and the SE of the DD, the following testable hypotheses emerge directly:

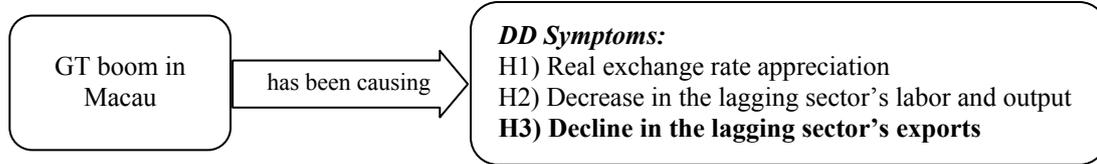


Figure 1: Testable Hypotheses

In the case of Macau, real exchange rate movements are expected to be different from those of a common small open economy as Macau's currency is under a fixed exchange rate regime due to the adoption of a Currency Board Arrangement under which the Pataca (i.e., Macau's currency) has been pegged to the Hong Kong Dollar since 1983, which in turn, has been linked to the United States Dollar, at a reference rate [15]. Hence, this paper tests specifically for H3), not only due to data accessibility, but also because resource booms tend to have a considerable effect on manufacturing exports as referred earlier.

## 4.2. Model Specification and Methodology

In order to capture the DD's effects in Macau, we focused on the relationship between the GT boom proxy variables and Macau's real Domestic Exports of Goods (DEXG), i.e., the exports of goods produced in Macau other than services, adjusted by the exports of goods deflator. This variable serves as dependent variable and as a proxy for the lagging sector's exports. Macroeconomic literature is consensual that a country's exports are a function of its importers income and of the relative prices. Hence, function (1) represents the initial domestic exports of goods function considered.

$$\text{DEXG} = f(\text{FGDP}, \text{TOT}) \quad (1)$$

Where FGDP stands for Foreign Gross Domestic Product and represents the GDP of the Group of Seven (G7). TOT corresponds to the Terms of Trade computed as the ratio of the exports of goods deflator (goods produced domestically) to the imports of goods deflator (goods produced abroad). Therefore, this variable is included in the model as an explanatory variable to capture the price effect.

Considering our primary purpose of assessing the DD's presence in Macau, the initial function (1) was extended in order to include variables as to proxy the GT boom until obtaining function (2). These additional variables include the Completion of Buildings in the territory (COMB), exports of services resulting from the Expenditure of Non-Residents in the domestic market (mainly in gaming and accommodation) to Total Exports ratio [ENR(%TE)], and Labor in the GT sector (LGT), which mainly refers to labor in hotels, restaurants, and recreational, cultural, and gaming services. While COMB serves as a proxy to FDI and ENR(%TE) to the local spending of Macau's visitors, LGT is considered as a proxy for both these sources of foreign currency inflow. The data sources used to collect these data were [4], [5], [6], and [14].

$$\text{DEXG} = f[\text{FGDP}, \text{TOT}, \text{COMB}, \text{ENR}(\% \text{TE}), \text{LGT}] \quad (2)$$

To perform the empirical estimations, we collected quarterly figures from 1998 to the first quarter of 2012. Given the use of quarterly data, each individual series was a seasonally adjusted, except for FGDP whose records had already been seasonally adjusted by the respective source, i.e., [14]. The overall equations are specified in the log-difference form; thus, the final variables represent an approximation to quarterly growth rates. The final variables were also tested for stationarity having passed both Augmented Dickey-Fuller and KPSS Tests. The econometric approach adopted was to estimate distributed-lag models with four lagged periods, since we used quarterly data, by Ordinary Least Squares (OLS), where initially all variables at period  $t$  and their respective lags from period  $t-1$  to period  $t-4$  were included. The resulting models, displayed in Table 1, were obtained after dropping insignificant independent variables, through sequential elimination, to correct for autocorrelation. The final model selected (equation (3)) was based on function (2) and was subjected to a range of tests to verify OLS assumptions.

$$\Delta \ln(\text{DEXG}_t) = \alpha + \beta_1 \Delta \ln[\text{FGDP}_{t-1}] + \beta_2 \Delta \ln[\text{TOT}_t] + \beta_3 \Delta \ln[\text{COMB}_{t-1}] + \beta_4 \Delta \ln[\text{ENR}(\% \text{TE})_t] + \beta_5 \Delta \ln[\text{ENR}(\% \text{TE})_{t-3}] + \beta_6 \Delta \ln[\text{ENR}(\% \text{TE})_{t-4}] + \beta_7 \Delta \ln[\text{LGT}_{t-4}] + \varepsilon_t \quad (3)$$

This study's hypothesis is that coefficients for the variables COMB, ENR(%TE), and LGT are negative. Moreover, the consensus view for the export function is that income elasticity is positive and price elasticity is negative. Therefore, we expect a positive coefficient for FGDP and a negative coefficient for TOT.

### 4.3. Results and Interpretation

This study started by running the regression corresponding to an initial model where the Domestic Exports of Goods depended only on foreign income and on relative prices (function (1)). Then, the proxy variables for the GT boom were gradually introduced in order to emphasize and control for the contribution of each variable to the estimation. The results are displayed in Table 1, where column (vi) corresponds to the final estimation selected, i.e., to equation (3).

Table 1. OLS estimates: Dependent variable -  $\Delta \ln(\text{DEXG})$

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Const	-0.093** (-4.815)	-0.090** (-4.829)	-0.086** (-4.808)	-0.087** (-5.056)	-0.063** (-3.264)	-0.068** (-3.570)
$\Delta \ln[\text{FGDP}_{-1}]$	12.721** (5.029)	11.829** (4.796)	13.351** (6.306)	12.981** (6.296)	12.473** (6.087)	12.260** (6.068)
$\Delta \ln[\text{TOT}]$	-1.534** (-3.941)	-1.580** (-4.205)	-1.101** (-3.015)	-1.397** (-4.363)	-1.085** (-3.122)	-1.376** (-4.450)
$\Delta \ln[\text{TOT}_{-2}]$			0.599* (1.686)		0.590* (1.745)	
$\Delta \ln[\text{COMB}_{-1}]$		-0.034** (-2.293)		-0.026** (-2.376)		-0.023** (-2.108)
$\Delta \ln[\text{COMB}_{-2}]$		-0.029* (-1.805)				
$\Delta \ln[\text{ENR}(\% \text{TE})]$			-1.701** (-4.311)	-1.699** (-4.452)	-1.851** (-4.859)	-1.818** (-4.877)
$\Delta \ln[\text{ENR}(\% \text{TE})_{-3}]$			0.739** (2.036)	0.675* (1.931)	0.644* (1.851)	0.591* (1.738)
$\Delta \ln[\text{ENR}(\% \text{TE})_{-4}]$			0.773** (2.182)	0.784** (2.276)	0.958** (2.767)	0.944** (2.765)
$\Delta \ln[\text{LGT}_{-4}]$					-0.865** (-2.376)	-0.752** (-2.073)
Observations	52	52	52	52	52	52
Adj. R <sup>2</sup>	0.429	0.470	0.603	0.625	0.640	0.650
Autocorrelation LM Test (LMF)	1.878	1.220	0.448	0.283	0.500	0.338
Durbin-Watson	1.723	1.785	1.784	1.730	1.733	1.744

Notes: t-statistics in parentheses, \* and \*\* indicate significance at the 10 and 5 percent levels, respectively.

The analysis of this table draws to the conclusion that including additional DD indicator variables continuously improved the estimations. All the coefficients expressed in these equations are significant at the usual 5% and 10% levels of significance, and estimates are identical across all variables with respect to the coefficients' signs. As far as income and price effects are concerned they confirm the traditionally expected positive and negative signs, respectively; showing that Macau's Domestic Exports of Goods are extremely sensitive to the income level of this territory's trade partners, and also evidencing that an improvement in Macau's terms of trade would certainly hurt the Domestic Exports of Goods.

All GT activity variables have negative and significant coefficients, except for the case of ENR(%TE) in periods  $t-3$  and  $t-4$ , which shows positive signs. Yet, the overall impact of this variable on DEXG is still negative. Hence, the hypothesis that coefficients for the variables COMB, ENR(%TE), and LGT would be negative is confirmed and, by means of this, the presence of the DD in Macau is diagnosed. In short, empirical evidence seems to confirm this study's initial hypothesis that the GT boom in Macau has been causing DD symptoms; specifically, a decline in this territory's lagging sector's exports of goods (Figure 1).

## 5. Conclusion

The post-2002 gaming era in Macau, marked by the GT boom, was accompanied by signs of deindustrialization and the suspicion of the DD's presence in this region. We confirmed this suspicion by estimating an empirical domestic export of goods growth rate model, which provided convincing evidence about the presence of this *disease* in that territory. In hand with the knowledge about the economic phenomenon behind the recent developments in Macau's economy, the contribution to the discussion among scholars and economic agents regarding the sustainability of this region's economy becomes more assertive. We believe that the main problem with the existence of the DD in Macau is that, in case of losing its gaming privileged position; there isn't presently an alternative activity capable of supporting the territory. As a result, we are in accordance with those authors (such as [10]) who suggest that resource abundant countries should pursue good investment policies and the promotion of good education. Therefore, we consider that directing the GT revenues to develop high quality education and health systems will lead to enhanced efficiency in the economy as a whole, and will as well prepare Macau's active population for an eventual decrease in the GT activity, as skilled workers will have the flexibility to embrace alternative activities.

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