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Do income policy mitigate the economic impacts of Covid-19 on tourism in Brazil?

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Abstract

This paper aims to estimate the hole of the government compensatory policy in order to mitigate the economic impact of pandemic COVID-19 on the tourism sector in Brazil. Tourist activities were the first to be strongly affected by the pandemic, and these impacts are expected to be the most prolonged ones. In this research, the method of partial hypothetical extraction, underling the input-output modeling, was used to simulate the economic impacts of two scenarios affecting the tourist activities and workers in this sector. As far as to our knowledge, this type of approach has never been applied before in the tourism context. The results show a potential decline of 31% in Gross Domestic Product (GDP) of tourist activities derived from the withdrawal of informal workers and tourist demand contraction. In addition, the government compensatory policy could mitigate these negative effects reducing it to 17%. Lodging services would be the most affected tourist activity.

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1. Introduction

The World Health Organization (WHO) classified COVID-19 as a pandemic in March 2020 after which lockdown measures began to be taken. Such measures have allowed the functioning only of essential sectors to decrease the speed of virus transmission in the country. Brazil has almost 12.7 million confirmed cases by the beginning of April 2021, one of the highest number of cases of COVID-19 in the world. Unfortunately, the number of cases and deaths this year is at its highest level since the beginning of the pandemic, which added to the slow process of vaccination and the relaxation of restrictive measures indicate that the pandemic is still far from its end in Brazil. This has been directly affecting the Brazilian economy, whose Gross Domestic Product (GDP) decreased 4.1% in 2020 (IBGE, 2021).

Tourist activities were one of the first to be immediately impacted, and given the intrinsic features of this sector, it will also suffer greatly and longer due to people's uncertainty to travel in the post-pandemic period and as such its economic recovery will be slow and gradual. According to the World Travel & Tourism Council's annual Economic Impact Report (EIR), due to Covid-19 pandemic, global tourism has lost almost US$ 4.5 trillion, which represents a decline on total GDP contribution from 10.4% in 2019 to 5.5% in 2020.

The intensity of the economic impacts will depend on the length of interruption of activities, on the implementation of economic policies to support the sector, and compensatory policies for individual workers. At the international level, the impact on the tourism sector is expected to be heterogeneous among countries due to the relative economic importance of the sector. According to the World Travel and Tourism Council (WTTC, 2020), tourism accounted for 7.7% of Brazilian GDP in 2019. Furthermore, in 2019, according to Continuous National Household Sample Survey (PNADC), in Brazil, 12.82% of households have at least one member who depends on tourism income.

Regarding the potential impact of the pandemic COVID-19, it is necessary to highlight the high rate of informality in the sector, which was about 30% in 2015 and 51.4% in 2018. Informal workers[1] are more vulnerable and immediately affected by the intensity of lockdown measures (ILO, 2020). While formal workers' losses are mitigated by traditional social protection measures, informal workers have no access to them. Additionally, from the demand side, people reduce their movements and reorganize their budgets to prioritize more immediate subsistence goods and services because of reduced income in the economy. Consequently, the supply and demand for tourism-related services are reduced almost simultaneously.

In order to alleviate the economic effects, the Brazilian government started a policy called "Emergency assistance", destinated to informal workers, self-employed and unemployed workers in low-income households. The benefits ranged from R$ 600 to R$ 1,800 per household and were paid from April to December 2020. Total expenditure on Emergency assistance corresponded to 4% of the GDP in Brazil. Thus, two important questions can be posed: (i) *what would be the* economic impact of pandemic COVID-19 on the tourism sector in Brazil*? (ii) do compensatory policies of income transfer mitigate these effects?*

Federal government rules and the varying intensities of the pandemic in regional and local economies make the simulations of lockdown policies difficult to model for the whole country at the sectoral level. Sectors and regions are unevenly affected by the spread of the virus. In addition, according to the Brazilian Constitution, the lockdown policies should be defined by

[1] We considered informal workers: Employers or Self-employed workers without formal registration; Domestic workers without a formal employment contract; Contributing family workers and workers in the private sector without a formal employment contract (IPEA, 2021).

local governments, at the municipal level. However, tourism and informal activities and workers are among the most homogeneously affected groups in the pandemic throughout the country.

2. Method and dataset

To answer the research questions, the simulation method is based on the partial extraction approach for input-output systems, developed by Haddad *et al.* (2020) to evaluate the impacts of the COVID-19 pandemic in São Paulo. This method was also applied to Bahia (Santos *et al.,* 2020) and Colombia (Bonet-Morón *et al.,* 2020).

Haddad *et al.* (2020) introduce imbalances in the supply and demand input-output system by internalizing lockdown policies. First, the labor supply (and respective payments) is constrained for different age groups of workers during the pandemic, as well as for informal workers. Second, the system is rebalanced, by a new set of constraints in the final demand vectors, based on the constrained income and supply of goods and services. A new equilibrium is generated in a constrained economy, which also results in a new Leontief Inverse Matrix. Moreover, we use the following advances proposed by Santos *et al.* (2020).

In the modeling based on input-output systems usually takes a vector $\boldsymbol{x}$ of gross production, a matrix of intermediate production flows $\boldsymbol{Z}$, a vector of final demand components $\boldsymbol{y}$, and vector $\boldsymbol{v}$ of payments for the services of production factors such as capital and labor. These vectors are built from disaggregated and consistent system of national accounts of the countries with $n=1, \ldots, N$ sectors; at least four final demand components: families, government, investors and exporters; payments for labor capital, rents and taxes (Miller & Blair, 2009).

The mathematical representation of the vectors and the consistency from the national accounts allows to model the supply and demand economic system. From the supply side: $\boldsymbol{x} = \boldsymbol{Zi} + \boldsymbol{y}$, and from the demand side $\boldsymbol{x'} = \boldsymbol{i'Z} + \boldsymbol{v'}$. In this system, $\boldsymbol{i}$ is a sum vector; and $\boldsymbol{v'}$ is the transposed vector from payments for factor services. A non-negative matrix of technical production coefficients, $\boldsymbol{A} = \boldsymbol{Z}(\hat{\boldsymbol{x}})^{-1}$, being $\hat{\boldsymbol{x}}$ a diagonalized vector, guarantees the equilibrium between the supply and demand system. The inverse matrix $\boldsymbol{L} = (\boldsymbol{I} - \boldsymbol{A})^{-1}$, known as Leontief Inverse Matrix, allows to simulate the direct and indirect impacts of exogenous variations in the final demand vectors: $\boldsymbol{x} = \boldsymbol{Ly}$.

In Santos *et al.* (2020), a new set of improvements is incorporated in the methodology. First, a non-negative allocation coefficients matrix $\boldsymbol{B} = \hat{\boldsymbol{x}}^{-1}\mathbf{Z}$ is used to generate a respective $\boldsymbol{G} = (\boldsymbol{I} - \boldsymbol{B})^{-1}$, known by Ghosh inverse matrix. The pandemic period constrained informal workers to keep their income, which was simulated imposing restrictions on the value-added vector. The restricted value-added vector $\bar{\boldsymbol{v}}$ was recovered following supply-side models in Miller and Blair (2009, Chap. 12), through the $\boldsymbol{G}$ matrix.

Second, the authors conditioned the constrains in the labor supply (due to lockdown policies) to the maintenance of supply of health services activities, introducing a resilience (non-stop) factor that tie the functioning of the whole set of interdependent sectors in the input-output system, endogenously to the operation of health sector at full, under or over capacity. Thus, based on the intermediate supply matrix $\mathbf{Z}$, and its respective intermediate demand of the health sector z_{is}, a vector of proportions $p = {}^{z_{is}}/_{x_i}$ is defined, being x_i the total supply of health sector i. This vector defines the dependence of each sector to intermediate demand of the health sector, s. A vector q, which is the normalization of p, at different capacity of the sector s ($q_s = 1$, for example), allows to compute the resilience factor $\boldsymbol{r} = (\boldsymbol{i} - \boldsymbol{q})$, used to flatten the constrained

labor supply $\bar{L}$, (constrained by the lockdown policies) by $\bar{\bar{L}} = \bar{L}\,\boldsymbol{r}$. The greater the dependence to intermediate demands of the health sector, the lower will be the supply restriction in these sectors to maintain the supply of health activities.

In order to assess the economic impact of pandemic COVID-19 on the tourism sector in Brazil, we incorporate the following methodological improvements. The demand effect is calculated based on two measures: foregone wages, as proposed in Haddad *et al.* (2020), and on the direct loss of tourism expenditure (domestic and international). To improve the measure of foregone wages, we disaggregate sectorial labor pay and consumption by income levels. For each household $h = 1,..,10$, the percentage change in consumption is weighed such that:

$$F_{ch} = \sum_{n} F_n w_{nh} \tag{1}$$

Where F_{ch} is the share of non-restricted consumption by household h, F_n is the share of non-restricted demand by sector and w_{nh} represents labor pay from sector n to household h. Therefore, each F_{ch} is used to calibrate the reduction in consumption by household h, assuming that the consumption drop is equivalent to the income change by household. By doing so, it is possible to adjust consumption considering the diversity of household income and consumption profiles and to better fit the compensatory policy effects.

Additionally, this work introduces a new vector of demand constraints relative to the share of tourism expenditure in household consumption and exports. This new constraint aims to measure the specific impacts of the lockdown on tourist activities restricting the demand side.

In summary, we evaluated the decrease in demand by looking at both the wage/job loss aspect of tourism workers and the direct loss of both domestic and international tourist expenditure.

2.1 Dataset

The economic model is parameterized using the most recent and official input-output matrix for Brazil, base year 2015, with 67 economic sectors (IBGE, 2018). The absence of a tourism satellite account in the matrix led to the use of the classification and data from IPEA (2015) to identify the tourist activities and measure its rate of informality. According to Table 1, the total informality rate in the Brazilian tourist activities was 30% in 2015. As can be seen, there also are heterogeneities among these activities[2], ranging from 3% in the Air transportation to 48% in Culture and recreation.

[2] In December 2018, most recent data, the informality rate was 51.4%.

Table 1: Employment data of Brazilian tourist activities, 2015

Activities	Formal	Informal	Total	Employment share (%)	Informality rate
Road transport	393,585	148,233	541,817	18.4%	27%
Water transport	6,407	1,970	8,378	0.3%	24%
Air transport	110,300	3,541	113,841	3.9%	3%
Accommodation	539,955	76,178	616,132	20.9%	12%
Food services	844,724	567,313	1,412,036	47.8%	40%
Transport rentals	49,297	17,893	67,189	2.3%	27%
Culture and recreation	22,193	20,884	43,077	1.5%	48%
Travel agency	111,006	37,528	148,534	5.0%	25%
Brazil	**2,077,466**	**873,539**	**2,951,006**	**100%**	**30%**

Source: IPEA.

To measure the demand values, the surveys of domestic (FIPE, 2012) and international tourism demand (MTUR, 2016) were used. Domestic tourism expenditure accounted for R$ 66.5 billion in 2011, updated to R$ 87.6 billion at 2015 values. International tourism expenditure accounted for R$ 18.9 billion in 2015. The employment share of tourist activities was used to breakdown the expenditure by sector, as in Ribeiro *et al.* (2017). Therefore, the estimated contraction of domestic and international tourist demand was 21.2% and 79.3%, respectively.

The labor incomes were disaggregated according to data from the Continuous National Household Sample Survey (PNADC) for 2019, while household consumption was broken down into different income deciles using Household Budget Survey (POF) data from the Brazilian Institute of Geography and Statistics (IBGE) for 2008-2009, both are the most recent data available. This is essential to map the income of informal workers by income deciles, as well as to identify eligible households to receive Emergency assistance from the government. It is important to highlight that all aggregated data from input-output matrix were kept as in the official dataset keeping its consistence. Therefore, the informal sector size was calibrated using the percentage of informal workers in each sector from PNADC, and the consumption vector was disaggregated using consumption shares from POF.

Data from PNADC showed around 11 million people would be eligible for receiving Emergency assistance, according to 2019 information. This means that 10.87% of the Brazilian household would have at least one recipient, and the total amount needed for the policy would be around R$ 50 billion. However, according to the government[3], more than R$ 230 billion were paid during 2020, indicating the number of recipients were around 4.6 times greater. The underestimation in PNADC-2019 data were expected because many Brazilians lost their jobs during the pandemics. Despite that, the criteria applied to 2019 data allowed us to locate eligible individuals along the income distribution and use this information to estimate the demand effect of the transfer received from the government.

Another information used was the Social Distancing Index (SDI) for Brazil, which was, according to InLoco, on average 47% in April 2020[4], well below the 70% recommended by

[3] Available at: http://www.portaltransparencia.gov.br/despesas/programa-e-acao?acao=00S4&ordenarPor=programa&direcao=asc

[3]<https://www.inloco.com.br/>

WHO. SDI shows the percentage of the population who are remaining in isolation based on the geolocation of cell phones in Brazil. In order to measure the economic impact of COVID-19 on tourist activities we defined two scenarios:

Scenario 1: withdrawal of 47% of informal workers and the contraction of domestic and international tourist demand (21.2% and 79.3%, respectively).

Scenario 2: taking into account the main compensatory policy of the Brazilian government, in addition to the same restrictions imposed in scenario 1.

3. Results and discussion

The compensation policy was initially implemented by the Brazilian federal government for a period of three months, when eligible unemployed, self-employed and informal low-income workers received a transfer of R$ 600 or R$ 1,200 per month[5]. The results are therefore presented in a cumulative manner by quarter. Figure 1 presents the impact on GDP of the Brazilian tourist activities for the scenarios 1 and 2. Tourist activities represented 6.45% of the Brazilian GDP in 2015. The tourism GDP would accumulate a decrease in the quarter of R$ 35.3 billion in scenario 1 and R$ 20.1 billion in scenario 2. The most impacted activities in absolute values would be those with the largest share in the sector: road transport and food services.

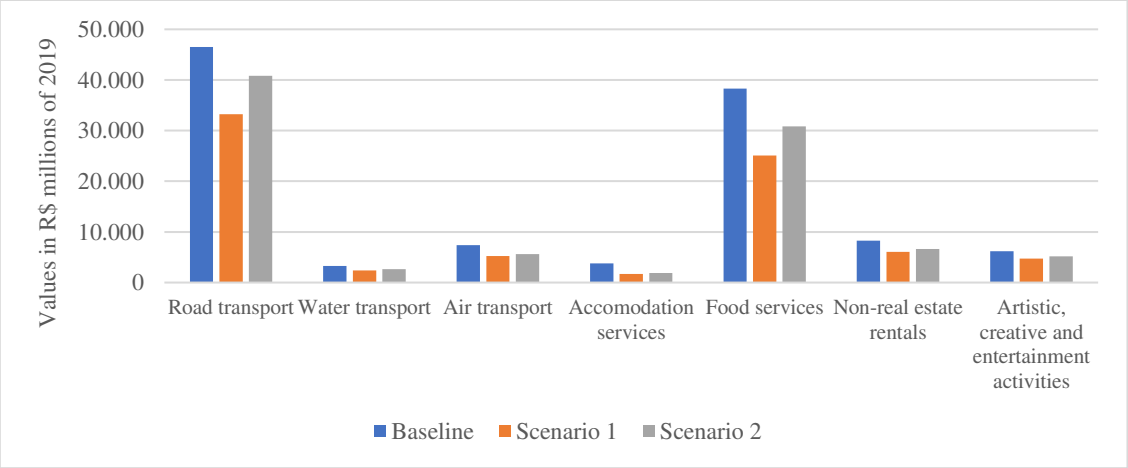

Figure 1: Economic impact of COVID-19 on tourist activities' GDP in Brazil

Authors' own.

Figure 2 shows the importance of the compensatory policy in mitigating the effects of the COVID-19 pandemic on tourist activities in Brazil. In general, the compensatory policy (scenario 2) would mitigate the pandemic's effects on all tourist activities. The 31% drop in tourism GDP in Brazil in the scenario 1 would be mitigated to 17.7% with the compensatory policy. The most impacted activity in relative terms would be accommodation services with a 55.2% reduction in GDP in scenario 1 to 50.9% in scenario 2.

[5] The benefit was directed to unemployed, self-employed, or informal workers who do not receive any other benefit from the Federal Government (except for Bolsa Família). Additionally, the individual must be over 18 years old, have no formal job, be a family with a per capita monthly income of up to half a minimum wage (R$ 522.50) or a total monthly family income of up to three minimum wages (R$ 3,135), and not have a taxable income in 2018 above R$ 28,559.70. Total benefit was limited to two beneficiaries per household. The R$ 1,200 benefit was granted only to mothers who are solely responsible for their families. The limited per household was R$ 1,800.

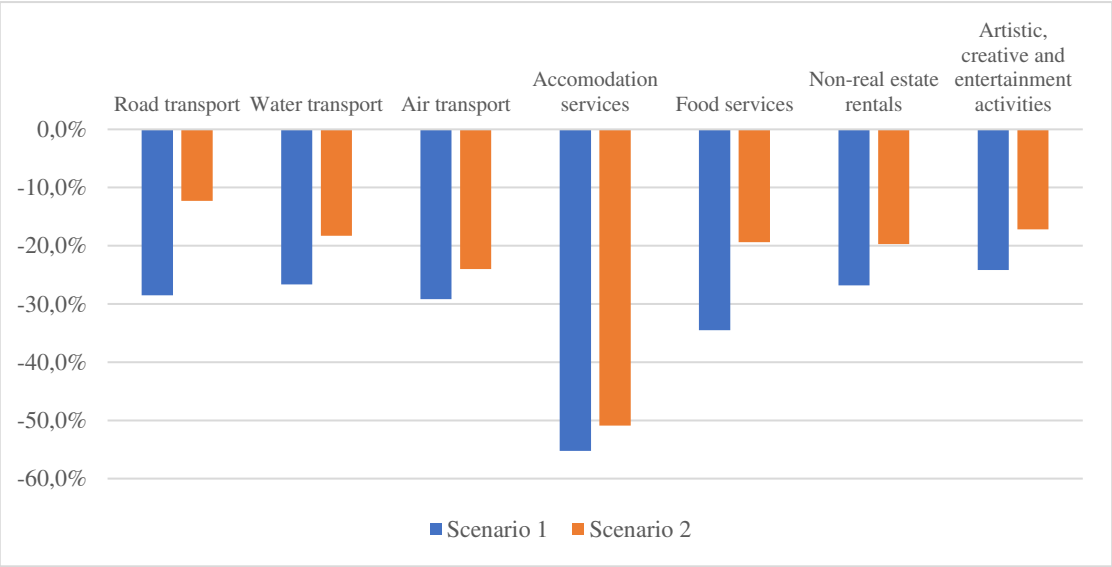

Figure 2: Relative economic impact of COVID-19 on tourist activities in Brazil (%)

Authors' own.

The activities in which the compensatory policy would have the greatest mitigation effect would be road transport and food services. This result is a combination of two effects. First, the high rate of informality, directly affecting the activity level by restricting income generation of informal workers. Road transport and food services hold the third and the second highest rate of informality (see Table 1) respectively, among the tourist activities. Second, the compensatory policy benefits sectors related to household demand, or directly related to then. In the case of food services, 82% of demand is destinated to households, while road services have deep input-output connections with almost all other sectors in the economy.

4. Policy implications

Our results point out the importance of government assistance in order to mitigate the impact of the pandemic on the tourism sector in Brazil (Fig 2). The Brazilian government had extended this assistance in 2021, however the value of the benefit decreased significantly, and the payment is expected to start in April. Furthermore, there are poor regions in Brazil highly dependent on tourism, where it is essential the employment protection scheme to be continued and improved. The situation for tourism workers is even worse, given that the expectation of a complete recovery cannot be foreseen, and the sector concentrates high informal employment rates and low-income individuals in a vulnerable situation.

A global pandemic affects the value chains of almost every industry, and our results should be interpreted with caution because bankruptcies and loan defaults, among others, cannot be modeled. Therefore, this is a limitation of our study.