0.1 Calibration

In this section, we outline the calibration process to replicate Brazilian economic characteristics, utilizing both literature and datasets. First, a region must be selected: in this study, region 1 corresponds to the State of São Paulo, which contributes 30% to the national GDP, as reported by **ibge_produto_2024**. While other regions or groupings are viable options, such as groups of States or Cities, the limitation is that the smallest region cannot be less than 0.03 of the total, ensuring model stability, as emphasized by **konopkova_pitfalls_2019**. Second, a year must be chosen: to avoid the pandemic shock that occurred in 2020, the year 2019 will be set as the baseline for establishing the parameters.

To designate Region 1 as more capital-intensive, the capital elasticity of production for Region 1 must be such that $\alpha_1 > \alpha_2$, while Region 2 is assigned the commonly accepted value of 0.30. Various parameters, such as the intertemporal discount factor β; interest-rate smoothing parameter γ_R; interest-rate sensitivity in relation to inflation γ_π; interest-rate sensitivity in relation to product γ_Y; capital depreciation rate δ; price stickness parameter θ; autoregressive parameter of productivity in region 1 ρ_{A1}; autoregressive parameter of productivity in region 2 ρ_{A2}; autoregressive parameter of monetary policy ρ_M; relative risk aversion coefficient σ; relative labor weight in utility ϕ; marginal disutility of labor supply φ; elasticity of substitution between intermediate goods ψ; standard deviation of productivity shock $\sigma_{A\eta}$; standard deviation of monetary shock σ_M , are drawn from existing literature, as documented in **costa_junior_understanding_2016** and **pereira_rbc_2021**.

The weight of region 1 in total production, θ_Y, is determined by the São Paulo GDP to Brazil GDP ratio, as presented in Table (**??**).

The productivity ratio θ_Z quantifies the relative productivity of Region 2 compared to Region 1, using GDP per total hours worked as a measure, as discussed by **krugman_defining_1997**. For that, the regional GDP from Table (**??**) will be divided by the total worked hours, which is given by the product of the number of the employed population and the avarage worked hour. Therefore, the productivity Z_η of each region and the productivity ratio θ_Z are:

$$Z_\eta = \frac{Y_\eta}{n_\eta L_\eta} \tag{0.1}$$

$$\theta_Z = \frac{Z_2}{Z_1} \approx 0.7151 \tag{0.2}$$

The weight of good 1 in the consumption composition $\omega_{\eta 1}$ for both regions is sourced from **haddad_matriz_2017**. Specifically, ω_{11} corresponds to item $a_{SP\times SP}$. Additionally, ω_{21} is calculated as the weighted mean of all state production (except São Paulo) with São Paulo as the final demand (column SP), taking into account the total production Y_i of each state:

$$\omega_{21} = \frac{\sum_{i=1}^{26} \omega_{iSP} Y_i}{\sum_{i=1}^{26} Y_i} \approx 0.095 \tag{0.3}$$

0.1.1 Brazilian GDP in 2019

Table 1: Brazilian GDP in 2019

State	GPD (R$)	Participation (%)	Productivity (R$/hour)
São Paulo	2.348.338.000	31,8	2.650
Rio de Janeiro	779.927.917	10,6	2.576
Minas Gerais	651.872.684	8,8	1.722
Rio Grande do Sul	482.464.177	6,5	2.159
Paraná	466.377.036	6,3	2.151
Santa Catarina	323.263.857	4,4	2.181
Bahia	293.240.504	4,	1.409
Distrito Federal	273.613.711	3,7	4.929
Goiás	208.672.492	2,8	1.569
Pernambuco	197.853.378	2,7	1.471
Pará	178.376.984	2,4	1.435
Ceará	163.575.327	2,2	1.206
Mato Grosso	142.122.028	1,9	2.141
Espírito Santo	137.345.595	1,9	1.836
Amazonas	108.181.091	1,5	1.864
Mato Grosso do Sul	106.943.246	1,4	2.162
Maranhão	97.339.938	1,3	1.225
Rio Grande do Norte	71.336.780	1,	1.489
Paraíba	67.986.074	,9	1.238
Alagoas	58.963.729	,8	1.538
Piauí	52.780.785	,7	1.260
Rondônia	47.091.336	,6	1.553
Sergipe	44.689.483	,6	1.361
Tocantins	39.355.941	,5	1.638
Amapá	17.496.661	,2	1.503
Acre	15.630.017	,2	1.405
Roraima	14.292.227	,2	1.773
Brasil	7.389.131.000	100,	2.067
Rest of Brasil	5.040.793.000	68,2	1.875

Source: **ibge_produto_2024**

0.1.2 Parameter Calibration

Table 2: Parameter Calibration

Parameter	Definition	Calibration
α_1	capital elasticity of production in region 1	0.4
α_2	capital elasticity of production in region 2	0.3
β	intertemporal discount factor	0.985
γ_R	interest-rate smoothing parameter	0.79
γ_π	interest-rate sensitivity in relation to inflation	2.43
γ_Y	interest-rate sensitivity in relation to product	0.16
δ	capital depreciation rate	0.025
θ	price stickness parameter	0.8
θ_Y	weight of region 1 in total production	0.318
θ_Z	productivity proportion between regions	0.7151
ρ_{A1}	autoregressive parameter of productivity in region 1	0.95
ρ_{A2}	autoregressive parameter of productivity in region 2	0.95
ρ_M	autoregressive parameter of monetary policy	0.9
σ	relative risk aversion coefficient	2
ϕ	relative labor weight in utility	1
φ	marginal disutility of labor supply	1.5
ψ	elasticity of substitution between intermediate goods	8
$\sigma_{A\eta}$	standard deviation of productivity shock	0.01
σ_M	standard deviation of monetary shock	0.01
ω_{11}	weight of good 1 in consumption composition of region 1	0.528
ω_{21}	weight of good 1 in consumption composition of region 2	0.095

Sources: The Author and **costa_junior_understanding_2016**

0.1.3 Variables at Steady State

Table 3: Variables at Steady State

Variable	**Steady State Value**
$\langle P_1 \quad Z_{A1} \rangle$	$\vec{\mathbf{1}}$
$\langle P_2 \quad Z_{A2} \rangle$	$\langle 1 \quad .7151 \rangle$
$\langle Z_M \quad \pi \quad \pi_1 \quad \pi_2 \rangle$	$\vec{\mathbf{1}}$
R	.0402
$\langle \Lambda_1 \quad \Lambda_2 \rangle$	$\langle .875 \quad .875 \rangle$
$\langle W_1 \quad W_2 \rangle$	$\langle 2.2208 \quad .8221 \rangle$
$\langle a_1 \quad a_2 \rangle$	$\langle 4.3957 \quad 1.3514 \rangle$
$\langle b_1 \quad b_2 \rangle$	$\langle .2175 \quad .1631 \rangle$
$\langle Y_1 \quad Y_2 \rangle$	$\langle .318 \quad 1 - Y_1 \rangle$
$\langle I_1 \quad I_2 \rangle$	$\langle .0692 \quad .1113 \rangle$
$\langle K_1 \quad K_2 \rangle$	$\langle 2,7667 \quad 4,4502 \rangle$
$\langle C_1 \quad C_2 \rangle$	$\langle 10,3802 \quad 1,8508 \rangle$
$\langle Q_1 \quad Q_2 \rangle$	$\langle 1,9969 \quad 1,3688 \rangle$
$\langle C_{11} \quad C_{12} \rangle$	$\langle 10,9443 \quad 9,,7835 \rangle$
$\langle C_{21} \quad C_{22} \rangle$	$\langle .2407 \quad 2.2928 \rangle$
$\langle L_1 \quad L_2 \rangle$	$\langle .0752 \quad .4929 \rangle$

Source: The Author.