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Beyond the Causeway: Spatial Impacts of the Johor–Singapore Economic Zone and Rail Link

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May 20, 2026

Abstract

This paper studies the general equilibrium effects of cross-border infrastructure and place-based industrial policy using a spatial model calibrated to Malaysia and Singapore. We evaluate the introduction of a Rapid Transit System (RTS) and a Special Economic Zone (SEZ) in Johor through counterfactual simulations that vary the location fundamentals such as productivity and trade costs. Across specifications, real incomes increase in all regions, indicating broad welfare gains driven by improved market access and lower consumption prices. At the same time, output and population reallocate toward the Johor–Singapore corridor, with states neighbouring Johor experiencing the largest adjustments. This spatial reallocation reflects localised productivity advantages in the corridor and endogenous labour mobility. The results further highlight that the SEZ and RTS complement each other: welfare gains from the joint policy are larger than the combined gains from separate policy implementation.

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1 Introduction

The launch of the Johor–Singapore Special Economic Zone (JS-SEZ) and the upcoming Johor Bahru–Singapore Rapid Transit System (RTS) mark a new phase of economic integration between Singapore and the Malaysian state of Johor. Such place-based policies undeniably affect the targeted regions, Johor and Singapore. But whether they induce unintended impacts on other regions, and, if so, how they affect those regions, remains unclear. On the one hand, the policy may simply hollow out the workforce and production in other states within Malaysia, and reallocate them to Johor without improving overall welfare[1]. On the other hand, consumers in other states may also benefit from the production boom in the Johor-Singapore corridor through trade linkages, thereby enjoying a spillover of welfare gains. Answering those questions is important, as evaluating the success of place-based policy should be based on an overall basis, and the local gains are only part of the story.

To answer such questions, this paper studies how the JS-SEZ and the RTS change the spatial equilibrium of the Malaysia-Singapore economy. The question is not simply whether these policies benefit Johor and Singapore, but how their effects propagate through trade and migration linkages to the rest of West Malaysia. The paper therefore asks how the two policies affect the distribution of production, population, and real incomes across space, and whether the places that gain activity are also the places where welfare rises most. Our focus is to study the corridor not as an isolated bilateral project, but as a shock to the broader spatial organisation of the Malaysia-Singapore economy.

To start with, the policies have immediate and multifaceted implications. The Special Economic Zone is designed to boost local productivity in the Johor-Singapore corridor by attracting investment from high-productivity multinational corporations. It also aims to enhance cross-border connectivity by reducing trade costs through streamlined customs procedures. The RTS, in turn, lowers the cost of cross-border travelling, improving labour mobility between Johor and Singapore, and saving travel time of cross-border consumption

[1] One fundamental concern of place-based policy is that it could simply shift economic activity to the targeted region, with limited or no aggregate gains. For example, Kline and Moretti (2014) finds that the productivity gain from agglomeration in the targeted region of Tennessee Valley Authority policy was fully offset by the losses in the rest of the country. Wilson (2009) and Einiö and Overman (2020) find similar outcomes for R&D and employment, respectively.

trips for consumers. Beyond these direct effects, the projects can generate spillovers to other Malaysian states through trade and migration links, which we aim to study with a spatial general equilibrium framework.

Formally, we develop a dynamic spatial general equilibrium model that encompasses Singapore and thirteen state-level regions in Peninsular Malaysia.[2] The framework explicitly models trade and migration flows between regions and allows for heterogeneous local productivities. We further differentiate the tradable manufacturing sector and the non-tradable service sector, as the policies have different implications across sectors. The integration policies enter the model as shocks that raise the corridor's productivity and lower both trade and migration costs between Johor and Singapore.

We calibrate the model using data on state-level population, output, bilateral migration flows, and road travel time. Given the projected costs' and productivities' changes driven by the policies, the model allows us to compute counterfactual changes in economic outcomes such as welfare, production, and population across regions, therefore quantifying the policy impacts. The framework offers several advantages for evaluating policies. Firstly, it enables us to quantify heterogeneous spatial impacts that depend transparently on geography. For example, Melaka, which is close to Johor and well connected to it by trade routes, experiences larger gains than more distant states such as Penang. Meanwhile, the more integrated labour market between Melaka and Johor — due to their geographical proximity — enables the policies to draw more workers out of Melaka, resulting in relatively larger population declines there than remote states. Secondly, the dynamic structure of the model enables us to trace spatial impacts over time and evaluate the effects at different horizons, such as 5, 20, or 50 years after policy implementation. Lastly, the model allows for the evaluation of many policy experiments, for example, a policy bundle of SEZ&RTS and domestic migration liberalisation within Malaysia. Doing so helps answer whether, and if not, how the current Johor-Singapore economic integration achieves its full potential.

Our main findings are as follows. Firstly, the joint JS-SEZ and RTS intervention raises

[2] Table A.1 lists all thirteen regions. We restrict attention to Peninsular Malaysia because West and East Malaysia are institutionally different, and we only consider trade by road mode, whereas connections to East Malaysia also involve air or sea transport. More details and the implications of assuming road-only trade are discussed in the calibration section.

welfare across all regions. Regional welfare, measured by local real income, increases by 2.4% on average in the Johor-Singapore corridor in 2030 and by around 0.1% in other states. Concurrently, the policies induce spatial reallocation of population and production. Johor's output and population grow by 4.5% each by 2030 under our benchmark estimates. However, output and population fall across the rest of Malaysia, with the largest declines concentrated in the neighbouring states of Melaka, Negeri Sembilan, and Pahang, which lose an average of 1.5% in output and 1.3% in population. Secondly, the SEZ and RTS reinforce each other: the economic impacts of the joint policy are larger than the combined impacts of separate policy implementation. Intuitively, the SEZ raises the return to locating in the corridor through productivity and trade-cost improvements, while the RTS relaxes the migration and service-trade frictions that would otherwise dampen the reallocation response. Thirdly, the long-run impacts of the policy shocks are larger than those in the short run. As trade and migration are costly across space, their adjustment to the policy unfolds gradually, yielding larger gains over time. Finally, we show that, under the scenario of reduced internal migration barriers within Malaysia, the SEZ and RTS would nearly double Johor's output gain to 7.6% while spreading the adjustment more evenly across the peninsula rather than concentrating it in the immediate hinterland of the corridor. This experiment suggests that policymakers could consider complementary measures, such as facilitating internal migration, to fully exploit the benefits of SEZ and RTS.

This paper contributes to the broad literature on evaluating the impacts of place-based policies; see Neumark and Simpson (2015) for an overview. Most of the previous studies empirically estimate the local impacts of the policies in major economies such as China, India, and the US (Wang 2013; Kline and Moretti 2014; Alder et al. 2016; Chaurey 2017; Lu et al. 2019; Gallé et al. 2024) and do not comprehensively quantify the overall impacts, complicated by spatial interactions through trade and migration. Only a few structurally evaluate the general equilibrium impacts of the policies (Rothenberg et al. 2025 for Indonesia). By contrast, our paper extends the current literature by developing and applying a spatial general equilibrium framework to the Malaysia-Singapore economy and evaluating the spatial impacts of the place-based policies. Such a policy analysis, to our knowledge, is lacking for this major economy composite in Southeast Asia.

Our paper is also related to a growing literature on quantitative spatial frameworks, pioneered by Allen and Arkolakis (2014) and Ahlfeldt et al. (2015). The quantitative spatial framework has been widely applied to many Asian developing countries, such as China (Fan 2019; Tombe and Zhu 2019; Ma and Tang 2020; Ma and Tang 2024), India (Donaldson 2018; Bonadio 2024), Indonesia (Bryan and Morten 2019), and Vietnam (Balboni 2025). We complement the literature by applying the framework in the context of Malaysia and Singapore.

The next section provides the policy background. Section 3 presents the dynamic spatial model, which formalises the spatial mechanisms through which the Johor–Singapore integration affects regional production, trade, and population. Section 4 lays out the calibration method and results, focusing on the pre-policy geographical landscape of productivity and costs. Sections 5 and 6 then report quantitative evaluation of the Johor-Singapore economic integration, and Section 7 concludes.

2 Policy Background

At least 300,000 people cross the Johor–Singapore Causeway daily, with peak-period commutes lasting up to three hours (South China Morning Post, 2025). This chronic congestion has spurred bilateral initiatives, notably the Johor–Singapore Special Economic Zone (JS-SEZ) and the Johor Bahru–Singapore Rapid Transit System (RTS) Link, aimed at deepening integration and easing border bottlenecks (Ministry of Trade and Industry Singapore, 2024). Singapore and Malaysia formalised these initiatives in 2024–2025 through high-level agreements, marking a new phase of economic cooperation. The JS-SEZ and RTS are designed to complement each other: the SEZ boosts investment and production in Johor and Singapore, while the RTS Link provides the physical connectivity to support increased cross-border flows (Singapore Economic Development Board, 2025).

2.1 Johor–Singapore Special Economic Zone (JS-SEZ)

The Johor–Singapore Special Economic Zone (JS-SEZ) is a bilateral initiative designed to deepen economic integration between Singapore and southern Johor by combining investment facilitation, trade and customs streamlining, and improved cross-border mobility. First announced in October 2023, it was formalised through a Memorandum of Understanding in January 2024 and a subsequent agreement signed at the 11th Malaysia–Singapore Leaders' Retreat in January 2025. The initiative is implemented through existing bilateral and state-level institutional arrangements, including the Joint Ministerial Committee for Iskandar Malaysia and relevant Johor development agencies.

Geographically, the JS-SEZ spans a large area of southern Johor, covering the main local authorities within Iskandar Malaysia as well as Pengerang. Its scale reflects the ambition to create a broad cross-border economic corridor linking Singapore with Johor's industrial, logistics, and greenfield development zones. In practice, the JS-SEZ is intended to provide Singapore-linked firms with access to Johor's land and labour while allowing Johor to benefit from Singapore's capital, technology, and regional business networks.

The zone prioritises a set of higher-value sectors, including advanced manufacturing, logistics, digital services, energy, tourism, and selected business services. More important for this paper, however, are the policy instruments through which these objectives are pursued. These include a one-stop investment facilitation mechanism, preferential tax treatment for qualifying firms and skilled workers, simplified customs procedures, and efforts to reduce frictions in the movement of workers and goods across the border. Together, these measures are intended to lower the cost of cross-border production, investment, commuting, and trade.

From the perspective of our framework, the JS-SEZ matters through three channels. First, by attracting firms and encouraging industrial clustering, it raises manufacturing productivity in Johor. Second, the JS-SEZ enables Singapore businesses to offload cost-intensive operations to Johor while retaining high-value, knowledge-intensive service functions, thus lowering operational costs in service production. As a result, the SEZ may also attract investment in the Singapore service sector, therefore raising service productivity in Singapore. Third, trade and customs facilitation reduces effective trade costs between Johor and Singapore, strengthening cross-border good trade linkages. These channels make the JS-SEZ a natural policy setting for analysing how productivity boom and lower trade costs can reshape economic activity, population distribution, and welfare across Johor and Singapore.

2.2 Johor Bahru–Singapore Rapid Transit System (RTS)

The Johor Bahru–Singapore Rapid Transit System (RTS) Link is a bilateral cross-border rail project connecting Bukit Chagar in Johor Bahru to Woodlands North in Singapore. The project was formalised through a bilateral agreement in 2018, resumed in 2020 after a temporary suspension, and is expected to begin operations around the end of 2026 or shortly thereafter. Once completed, it will provide a direct rail connection between Johor Bahru and Singapore's MRT network, substantially improving cross-border connectivity.

The RTS is designed primarily to reduce commuting time and congestion along the Johor–Singapore corridor. The line is short, about 4 km in length, but its economic significance lies in the sharp reduction in effective travel time between the two sides of the border. The rail journey itself is expected to take only a few minutes, with co-located customs and immigration facilities further reducing the fixed time costs associated with border crossing. Relative to current peak-hour travel by road, this represents a major fall in the generalised cost of commuting between Johor and Singapore.

From the perspective of this paper, the RTS matters mainly through the population-mobility channel. By making cross-border movement faster, more predictable, and less burdensome, it lowers the effective commuting cost and travel time of consumption trips between Johor and Singapore. This expands the feasible commuting shed for workers living in Johor and employed in Singapore, while also improving access to Johor for firms, consumers, and service providers based in Singapore. Moreover, the improved daily access across the strait can potentially reduce long-run reallocation cost (or migration cost) between Johor and Singapore. For instance, the RTS lowers the effective cost of maintaining social and economic ties to Johor for migrants in Singapore. In spatial equilibrium model terms, the RTS reduces the migration cost imposed by the border, and improves cross-strait service market access.[3]

The RTS may also generate indirect trade and productivity effects. Although it is a passenger rather than freight project, it can ease congestion on existing road links and improve the coordination of cross-border business activity. More frequent business travel,

[3] Since our framework abstracts from daily commuting, we only consider RTS's impact on the cross-border migration cost and on the cross-border consumption trips.

lower uncertainty in travel times, and greater day-to-day interaction between firms and workers may all strengthen economic integration across the corridor. For this reason, the RTS complements the JS-SEZ: while the JS-SEZ lowers institutional and policy barriers to cross-border production and investment, the RTS reduces the physical and time costs of movement. Together, they provide the main policy basis for modelling lower trade and migration frictions between Johor and Singapore.

3 The Model

To formalise the channels described above, we consider a simplified version of Caliendo et al. (2019). The economy consists of N geographically segmented locations indexed by i or n, representing Malaysian states or Singapore. Throughout the paper, i denotes the origin and n the destination. The economy has two sectors indexed by j: the manufacturing sector and the service sector. The manufacturing sector is tradable across all locations subject to trade costs, but the service sector is tradable at costs only in continuous urban areas consisting of multiple locations[4]. Locations can trade with one another with trade frictions, and workers can migrate between locations, subject to migration costs. Time is discrete and indexed by $t = 0, 1, 2, \ldots, \infty$. The geography of the spatial economy is characterised by differences in productivities, amenities for residents, trade linkages, and access to labour pools in other locations.

In the following, we briefly outline the model and show the main insights in evaluating the policy shocks, and leave the full model discussion in the appendix B.

3.1 Workers and Migration

Workers supply one unit of labour inelastically each period and are employed full-time. They are freely mobile across sectors within the residing location, so that sectoral wages are the same for each location. The workers consume all their income each period and do not save. At the end of each period, workers decide where to migrate for the next period, facing

[4]For example, Singapore and Johor Bahru constitute a large contiguous urban area. It is common that Singapore residents travel daily across the straits and consume services in Johor Bahru, and vice versa. Therefore, service is tradable between Singapore and Johor. Another case is Kuala Lumpur and Putrajaya.

bilateral migration costs. The workers have perfect foresight in the sense that their predicted economic variables are the actual equilibrium values. They also have perfect knowledge of the evolution of geography fundamentals.

Given this setup, the workers maximise the value by choosing the best residing location in each period. We have the following solution to the workers' problem as the migration condition in equilibrium:

$$D_{ni,t} = \frac{\exp\left[(\beta V_{n,t+1} - \kappa_{ni,t})/\rho\right]}{\sum_{n'=1}^{N} \exp\left[(\beta V_{n',t+1} - \kappa_{n'i,t})/\rho\right]}, \tag{1}$$

where $V_{n,t+1}$ is the expected value in the next period living in the destination location n, $\kappa_{ni,t}$ is the bilateral migration friction moving from origin i to destination n, and ρ is the semi-elasticity of migration. The expected value of residing in n, $V_{n,t+1}$, depends on the local amenity, wage rate, and cost of living in n. Specifically, it is increasing in wages and amenities, and decreasing in the cost of living.

Intuitively, equation 1 shows that a worker currently living in i is more likely to move to n if 1) the wage rate in destination n is higher; 2) the cost of living in n is lower; 3) the amenity in n is higher; 4) the migration friction between i and n is lower. The equation directly speaks to the policy impacts: workers in other states tend to move toward the Johor-Singapore corridor if the policy increases the real wage in the corridor. Moreover, people in neighbouring states of Johor, which have lower bilateral migration frictions with the corridor than remote states do, face stronger incentives to move in.

3.2 Production and Trade

Firms in each sector j location i produce a single differentiated variety and operate in a perfectly competitive market. Production in sector j uses only labour L_{it}^{j} as input, with a constant return to scale technology as

$$y_{it}^{j} = z_{it}^{j} L_{it}^{j},$$

where z_{it}^j denotes location-specific exogenous productivity in sector j. Production is static in the sense that firms only maximise current-period profits.

Bilateral trade happens following the idea of the standard Armington setup (Armington, 1969): within each sector, the differentiated variety produced in each location is unique and location-specific, and consumers in other locations need to import such variety in order to consume it. We assume standard *iceberg* trade costs between locations: to deliver one unit of a variety from location i to location n, a firm in i must ship $\tau_{ni,t} \geq 1$ units. The consumer price in n of a variety produced in i is therefore

$$p_{ni,t}^j = \tau_{ni,t}^j \left(\frac{w_{it}}{z_{it}^j} \right),$$

where w_{it} is the wage rate in location i.

Given this setup, we obtain the gravity-type trade equation as the second main equilibrium condition: for each sector j, the share of importer n's total expenditure spent on goods from exporter i is

$$\pi_{ni,t}^j = \frac{(\tau_{ni,t}^j w_{it}/z_{it}^j)^{-\theta}}{\sum_{m=1}^N (\tau_{nm,t}^j w_{mt}/z_{mt}^j)^{-\theta}}. \tag{2}$$

This trade-share expression captures how bilateral trade costs, wages, and productivity jointly determine trade flows across locations. More specifically, the importer n buys more from the source i if 1) exporter i produces a variety at a lower cost due to either a lower local wage rate or a higher local productivity; 2) the bilateral trade cost between n and i is smaller. Consider the scenario in which the JS-SEZ improves the local productivity. Johor produces varieties more cheaply than it does in the absence of policy. As a result, it will export more low-cost goods to other states, eventually lowering living costs and improving welfare for consumers there.

4 Calibration

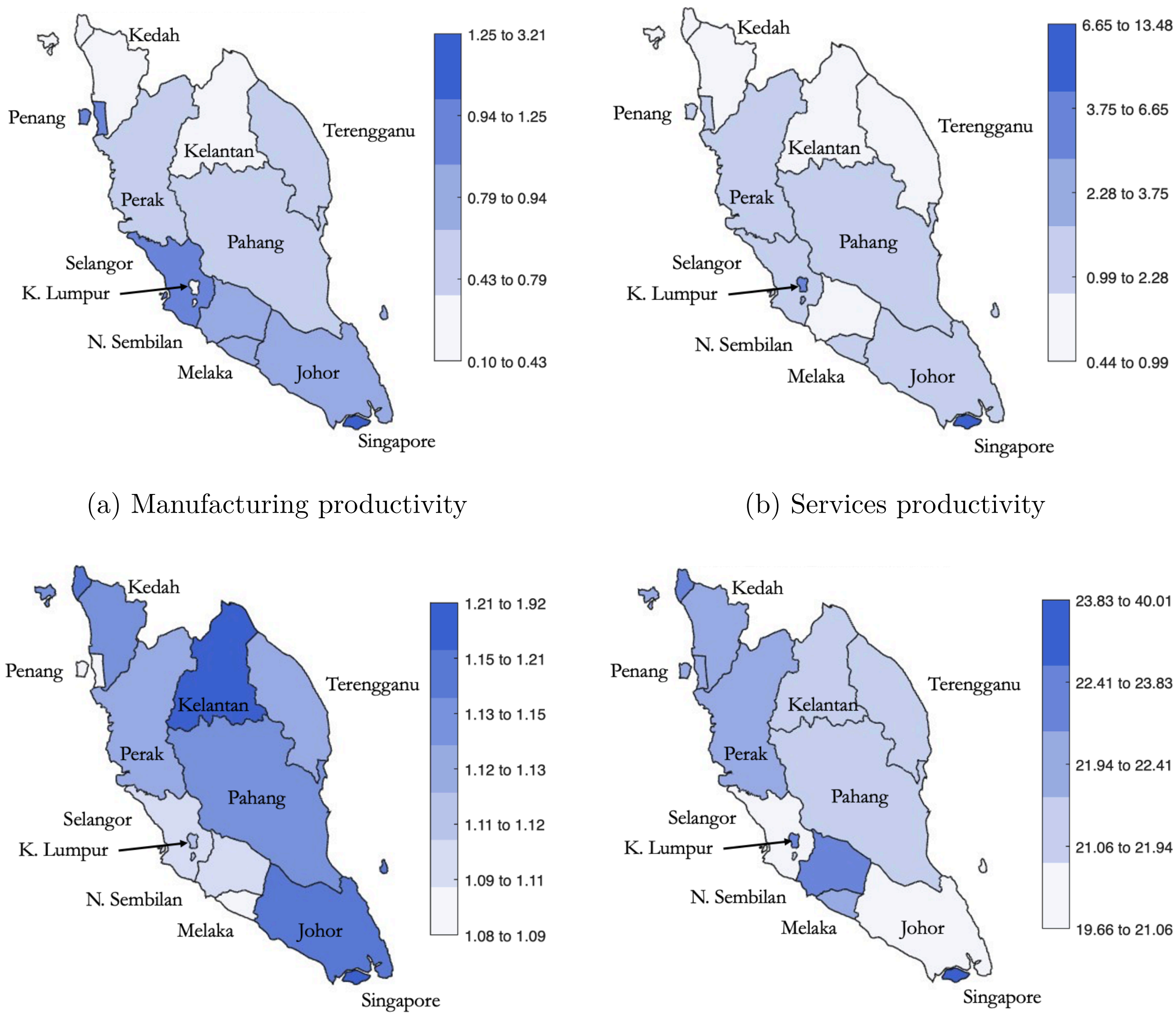
Solving the model at the level and running simulations require geographic information, including trade costs, migration costs, local productivities, and local amenities. We set the year 2019 as the initial year. Each time period in the model represents one year in the real world. We assume that those geography fundamentals have been time-constant since 2019 in the baseline economy. Our calibration procedure consists of three steps: in the first step, we externally calibrate some parameters either from the literature or from model-implied structural equations; in the second step, conditional on the externally calibrated parameters, we calibrate some of the remaining parameters in the initial static equilibrium at year 2019, without solving the whole dynamic equilibrium; in the final step, we solve the remaining parameters in the dynamic equilibrium, conditional on all previously-recovered parameters. In this section, we discuss only the calibrated geography fundamentals recovered from the calibration procedures, and refer to Appendix C for more details on each calibration step and data sources.

4.1 Calibration Results

Before turning to the counterfactual experiments, we summarise the calibrated baseline geography of the Malaysia–Singapore economy. Figure 1 reports the location fundamentals implied by the model, including sectoral productivities, average trade costs, and average migration costs. The average trade cost per location reflects the degree of market access enjoyed by local firms when trading nationally. The average migration cost captures the relative ease with which local workers can relocate to other labour markets[5]. These objects are recovered to match observed output, trade, and population patterns in the pre-policy period and characterise the spatial structure of the economy prior to the implementation of the Johor–Singapore Special Economic Zone and the Rapid Transit System. The figures are intended to provide intuition for the spatial responses documented in the subsequent simulations, which we will see in the next section.

The calibrated productivity maps suggest that the pre-policy economy is already organised around a clear spatial hierarchy, with Singapore as the dominant productivity centre and Johor occupying a relatively strong position within Malaysia, especially compared with

[5] Specifically, the average trade cost for location i is computed as population-weighted average export cost: $\sum_{n=1}^{N}(l_n/\sum_{n'} l_{n'})\tau_{ni}$; the average migration cost for location i is similarly $\sum_{n=1}^{N}(l_n/\sum_{n'} l_{n'})\kappa_{ni}$, where all bilateral costs, τ_{ni} and κ_{ni}, are calibrated, and l_n is 2019 population.



(a) Manufacturing productivity

(b) Services productivity

(c) Average trade costs

(d) Average migration costs

Figure 1: Calibrated geography fundamentals

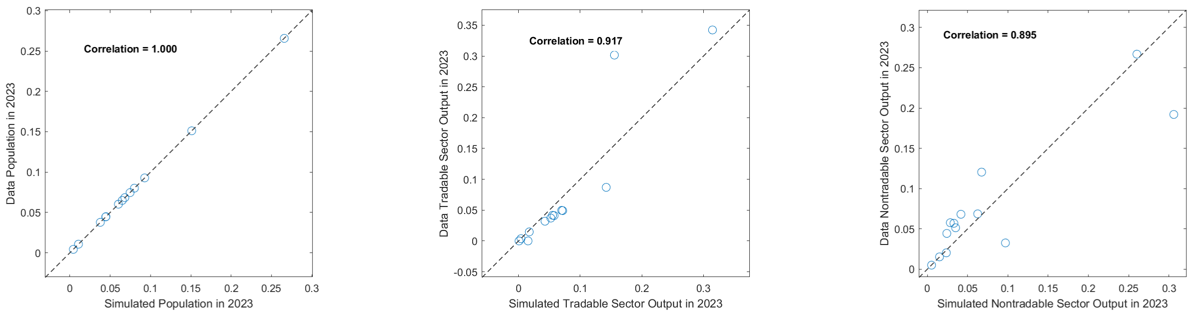
Notes: these figures show the calibrated location fundamentals for 13 state-level regions in Peninsular Malaysia plus Singapore at the initial year of 2019. Manufacturing productivity in Johor is normalised to be 1, and productivity in other states and sectors is relative to it. Average trade and migration costs for each state are computed as in footnote 5.

more peripheral states. More broadly, higher productivity appears concentrated along the southern and western corridor, while the northern and eastern coast states tend to be weaker. In particular, Singapore enjoys a larger productivity advantage over Johor in the service sector than in the manufacturing sector, suggesting that within the Johor-Singapore corridor, Singapore has a comparative advantage in the service sector while Johor has a comparative advantage in the manufacturing sector. This fact is in line with the design of JS-SEZ, which aims to promote Johor as an advanced manufacturing hub while utilising Singapore's strength in service and R&D.

The calibrated cost maps show that the baseline geography is shaped not only by productivity differences, but also by uneven spatial frictions, and these frictions operate differently for trade and migration. Locations along the main corridor, especially Johor, appear relatively well placed in terms of trade access, while more peripheral states face higher effective costs. At the same time, migration frictions remain substantial and are distributed less smoothly, indicating that labour mobility is more constrained than goods-market adjustment, particularly once cross-border barriers with Singapore are taken into account. This implies that the pre-policy economy already favours the Johor-Singapore corridor through better market access, but still contains enough mobility frictions to slow down large population shifts. In economic terms, this configuration means integration is likely to work first through prices, trade, and market access, with labour reallocation occurring more gradually, which is why the model can generate broad welfare gains while still producing a more concentrated spatial pattern of output and population change around the Johor-Singapore corridor.

4.2 Fitness of Model

We evaluate the fitness of the quantification by comparing simulation results with observed data for untargeted economic outcomes. Though we use initial population and sectoral outputs as targets in initial equilibrium calibration, the population and sectoral outputs along the transition path are not directly targeted. Figure 2 illustrates the correlation between the baseline simulated outcomes at year 2023 and their data counterparts in the same year[6]. Overall, the correlations between the model and data range from 0.90 to 1, suggesting that the model can capture the real-world spatial economy well even though the model and the real world evolve separately after the initial year 2019.



(a) Population (b) Manufacturing Output (c) Service Output

Figure 2: Model Fit on Untargeted Outcomes.

Notes: those figure plots the population, output in the manufacturing sector, and output in the service sector implied by the model against their counterparts in the data, for the year 2023. All economic variables are normalised as shares. Therefore, each dot represents the location's share of population or output. The dotted lines are 45-degree lines.

5 Impacts of Johor-Singapore Economic Integration

With the calibrated economy in hand, we turn to the policy counterfactuals. We quantify the impacts of Johor-Singapore economic integration by comparing the simulated counterfactual economy in which the JS-SEZ and RTS are implemented from the year 2025 and 2027, respectively, and a simulated baseline economy in which those two policies are absent. We choose the wage rate of Johor as the numeraire in all simulations. In evaluating the policy impacts for each location i, we consider three economic outcomes: local welfare, measured by real income (equivalently, the real wage) w_{it}/p_{it}[7], local population L_{it}, and local output $w_{it}L_{it}$. Specifically, let x' denote the counterfactual equilibrium counterpart of economic vari-

[6]We choose year 2023 because we use population data in 2024 to calibrate amenities, as discussed in detail in C.2. Therefore 2023 is the latest year before SEZ inauguration.

[7]The variable p_{it} is the price index of consumption in i, defined as in B.4. It measures the local cost of living. We choose the real income as the welfare measure since it is straightforward and intuitive. Alternatively, we can measure workers' welfare by the expected lifetime value, V_{it}, which is comprehensive as it captures amenity and migration prospects. For robustness, we consider welfare impacts using V_{it} and report the results in the appendix D.1.

able x in the baseline equilibrium. We first solve baseline and counterfactual equilibria at the levels, and then quantify the policy impact on location i's real wage as $(w'_{it}/p'_{it})/(w_{it}/p_{it})$ at period t, impact on population as L'_{it}/L_{it}, and impact on output as $(w'_{it}L'_{it})/(w_{it}L_{it})$. We report the policy impacts in percentage change, calculated as $100\% \times (x'/x - 1)$.

In simulating the counterfactual economy, we treat the JS-SEZ and RTS as two separate economic events that permanently change location fundamentals in Johor and Singapore, starting from the implementation year. Specifically, the RTS 1) lowers the migration costs between Singapore and Johor, and 2) reduces the services trade costs between Singapore and Johor. Regarding the JS-SEZ, we assume that it 1) induces an increase in local manufacturing productivity in Johor and an increase in service sector productivity in Singapore, a result driven by sectoral investment inflows of productive multinationals in the two locations[8], and 2) lowers the manufacturing goods trade costs between Singapore and Johor. Empirically, two channels justify why the policy-induced investments are productivity-enhancing. First, the arrival of new productive firms per se can increase the average local productivity (Chaurey 2017). Second, the productivity of the local incumbent firms improves as a result of agglomeration economies fueled by new firm arrival (Greenstone et al. 2010; Kline and Moretti 2014).

As the JS-SEZ was just implemented in 2025 and the RTS is anticipated to open at the end of 2026, the direct impacts of the policies on location fundamentals have not yet been observed. Instead, we estimate the impacts based on evidence from the literature. We assume the JS-SEZ increases local sectoral productivity by $1.5\% - 19\%$, starting in the inauguration year 2025, consistent with the literature on the positive impacts of special economic zones on local productivity (Wang 2013; Alder et al. 2016; Lu et al. 2019). We consider the lower bound of 1.5% productivity change as our benchmark, and leave the results for the upper bound scenario in the appendix. Regarding trade cost reduction, we consider that the SEZ alleviates the *border effect* that impedes cross-border trade by streamlining customs procedures. Since Singapore is geographically integrated with the economic centre

[8]The policy aims to promote manufacturing investment in Johor by utilizing its vast and cheap land, and can boost service sector investment in Singapore by tapping Singapore's advantages in research and development. Though the model does not explicitly model interregional capital movement, we consider its implications: the policy-induced multinational entry and technology transfer are captured by a positive local productivity shock.

of Johor state, Johor Bahru, the trade costs between Singapore and Johor are mainly due to the border effects. While many studies estimate border effects (Anderson and Van Wincoop 2003; Havranek and Irsova 2017; Coughlin and Novy 2021), few attempt to decompose the border effects or estimate the contribution of customs and administration procedures. Anderson and Van Wincoop (2004) provides a rough breakdown of the border barrier and shows that 18% of it is due to the policy barrier[9]. Sadikov (2007) shows that each extra signature requirement for exporting is equivalent to a 5% tariff increase[10]. Given those results, we assume a modest 10% reduction in manufacturing trade costs due to JS-SEZ implementation as the benchmark, and evaluate the cost reduction ranging from $5 - 18\%$ in the appendix for robustness. In estimating the magnitude of service trade cost reduction due to RTS, we refer to the study on a similar scenario (Lee and Tan 2024), where the downtown line opening in Singapore during 2015-2018 reduced travel time of consumption trip for locals by around 9 percent. Therefore, we assume a 10 percent reduction in service-sector trade costs due to RTS[11]. The 10 percent reduction is arguably conservative, as RTS not only saves travel time on consumption trips in terms of geographic connectivity, but also smooths the cross-border movement process. Nevertheless, we consider this magnitude as our lower bound estimation. Finally, we simply assume a 10% reduction in migration cost between Singapore and Johor due to the RTS.[12]

[9]In the original paper, for developed countries, the border barrier of a magnitude of 44 percent tariff equivalence is broken down as follows: an 8-percent policy barrier (tariff and non-tariff measures), a 7-percent language barrier, a 14-percent currency barrier (from the use of different currencies), a 6-percent information cost barrier, and a 3-percent security barrier. Out of those components, the policy barrier is the only relevant component for JS-SEZ. Thus, we assume the JS-SEZ reduces some policy barriers, but not all, as the policy only addresses a small part of it. Accordingly, the upper bound of cost reduction could be 18 percent.

[10]JS-SEZ simplifies the customs procedure, as businesses are only required to apply for a *single* transhipment permit with Singapore Customs for land intermodal transshipments, replacing the previous *two*-permit requirement. Therefore, the lower bar effect on trade cost reduction could be 5 percent.

[11]Lee and Tan (2024) shows that, for Singapore workers, the median travel time for consumption trips is 22-23 minutes. While the paper does not directly provide the exact number of travel time changes after downtown line opening, we estimate the travel time reduction is around 2 minutes based on the distribution plot of time change (Figure A6), thus around a 9 percent reduction.

[12]The quantitative spatial literature usually differentiates migration costs and commuting costs (e.g. Monte et al. 2018): the former refers to the moving cost of relocating from one to another residing region in a quarterly or yearly timespan, while the latter usually is daily travelling costs between residence and workplace in an urban setup. The RTS clearly reduces commuting costs. Our framework abstracts from cross-border commuting and thus commuting costs. RTS still arguably reduces the migration cost between Johor and Singapore. The bilateral migration friction κ_{ni} is a reduced-form parameter that captures all barriers to spatial reallocation, including the disutility of separation from one's origin region. By dramatically reducing

In the following, we first consider the spatial impacts of JS-SEZ and RTS separately, and then evaluate the full impacts of their joint implementation, which is our main focus. Such a procedure allows for comparing the impacts of JS-SEZ and RTS and assessing the relative contribution of each policy to the joint impacts. Most importantly, it helps identify whether the two policies complement each other, generating gains beyond what either policy would achieve in isolation.

5.1 Impacts of JS-SEZ

We first evaluate the spatial impacts of JS-SEZ alone, in the absence of RTS. Specifically, we compare the baseline real-world economy with a counterfactual in which only JS-SEZ enters the model and changes location fundamentals.

Table 1 shows that the SEZ improves welfare across all locations in the peninsula and, at the same time, reallocates economic production toward Johor. In particular, Johor and Singapore, the locales of the policy, reap the largest welfare gain, as real income increases on average by 1.47 percent. The policy not only raises real incomes in Johor–Singapore corridor, but also boosts welfare in other Malaysian states: average real wage increases by 0.03 percent in the neighbouring states of Johor and by 0.02 percent in more remote states. This spillover of welfare gain actually operates through the interstate trade linkages. With a policy-induced manufacturing productivity boom, Johor now produces goods at a lower cost. Consumers in other states can enjoy the cheaper manufacturing goods produced in Johor through bilateral trade. The cheap consumption thus lowers local living costs and improves workers' real incomes[13], as summarised in equations B.4 and B.5. Meanwhile, the policy reshapes the spatial distribution of economic activity in the peninsula, concentrating production toward Johor. As Table 1 shows, population in Johor increases by 2.03 percent, and local GDP also rises by the same amount[14], while other states in Malaysia experience losses in population and output. The mechanism for this spatial reallocation is straightforward. The productivity

travel time between Johor Bahru and Singapore, the RTS lowers the effective cost of maintaining social and economic ties to origin for migrants in the host, reducing the total utility cost of relocation.

[13]Figure D.2 in the appendix further decomposes the spatial impacts on nominal wages and costs of living. It clearly shows the policy increases real income by mainly driving down costs of living.

[14]Recall that we choose the nominal wage rate of Johor as the numeraire.

boom in Johor improves real wage in Johor and thus the working prospects there. As a result, workers from other states have strong incentives to move to Johor to enjoy such benefits, as summarised by the migration condition 1. This large inflow of workers to Johor increases the local labour supply, thus leading to an output boom in Johor. Figure D.1 in the appendix further shows the patterns of spatial impacts over the map of the peninsula.

Table 1: Spatial impacts of JS-SEZ only (%)

	GDP	Population	Real wage
Johor–Singapore corridor			
Johor	2.03	2.03	1.65
Singapore	-0.75	0.03	1.28
Average	*0.64*	*1.03*	*1.47*
Neighbours			
Melaka	-1.78	-0.61	0.03
Negeri Sembilan	-1.59	-0.37	0.02
Pahang	-2.02	-0.89	0.04
Average	*-1.80*	*-0.62*	*0.03*
Other states			
Kuala Lumpur	-1.49	-0.25	0.02
Pulau Pinang	-1.46	-0.21	0.01
Selangor	-1.46	-0.21	0.01
Northern states	-1.68	-0.47	0.02
Average	*-1.60*	*-0.38*	*0.02*

Notes: Entries report percentage changes under the lower-bound scenario for the JS-SEZ-only intervention. Northern states average covers Kedah, Kelantan, Perak, Perlis, and Terengganu.

A more interesting result from Table 1 is that the spatial impacts of SEZ are heterogeneous across locations outside the Johor-Singapore corridor. Although real wages increase in all states outside the corridor, they rise more in neighbouring states than in remote states. Similarly, neighbouring states lose more population and output compared to remote states. For example, the nearby state Pahang enjoys a 0.04 percent welfare improvement while the remote northern states experience only 0.02 percent on average. Intuitively, neighbouring states have lower trade and migration costs with the corridor. As a result, firms in Johor have better access to those export markets and the labour pools. In other words, the neighbouring states have a greater policy exposure than remote states, and thus the spatial spillovers are stronger there.[15]

In summary, the SEZ concentrates production locally (a spatial reallocation) while transmitting part of the welfare gain through trade (a welfare gain spillover). In the following, we will consider the spatial impacts of another event, the opening of RTS.

5.2 Impacts of RTS

In evaluating the impacts of RTS alone, we consider a counterfactual economy with RTS but not SEZ, and compare it with a policy-absent baseline economy. Table 2 summarises the quantitative results, and Figure D.3 in the appendix plots the spatial patterns over the map.

The RTS lowers bilateral migration costs and service trade costs between Johor and Singapore, but does not directly raise productivity. The policy therefore reduces segmentation within the corridor rather than altering relative technology across locations. Its main effect is to deepen integration between Johor and Singapore.

This distinction is reflected in the spatial pattern of the results. In the absence of a direct productivity shock, the RTS does not generate the same strong expenditure switching toward a single production centre as the SEZ. Instead, lower bilateral frictions improve access within the corridor. Johor becomes a more attractive residential and production base because access to Singapore improves, while Singapore continues to function as the high-wage employment and service centre. Most notably, Singapore's output grows by 1.78 percent (compared to -0.75% in the SEZ-only simulation), though some of its labour force choose to reside in Johor. This significant output boom is due to the joint effects of policy-induced improvement in cross-strait service access and Singapore's role as a major service producer.

The neighbouring states again help identify the channel of adjustment. Their population responses are negative, suggesting that the corridor draws workers from its immediate hinterland once access improves. Yet their output responses are much weaker than under the SEZ, and in most cases remain positive. This pattern is consistent with an access

[15] Here, we only consider the three land-adjacent states of Johor as trade happens through the road network. If we also consider sea route access, well-connected states by sea, such as Penang and Selangor, may experience greater policy impacts, potentially of a similar magnitude to what we observed in neighbouring states in the current simulation.

Table 2: Spatial impacts of RTS only (%)

	GDP	Population	Real wage
Johor–Singapore corridor			
Johor	2.30	2.30	1.67
Singapore	1.78	-0.18	0.11
Average	*2.04*	*1.06*	*0.89*
Neighbours			
Melaka	0.59	-0.53	0.13
Negeri Sembilan	0.68	-0.31	0.09
Pahang	-0.02	-0.93	0.08
Average	*0.42*	*-0.59*	*0.10*
Other states			
Kuala Lumpur	0.64	-0.23	0.07
Pulau Pinang	1.14	-0.08	0.13
Selangor	0.67	-0.20	0.06
Northern states	0.32	-0.51	0.05
Average	*0.51*	*-0.38*	*0.06*

Notes: Entries report percentage changes under the lower-bound scenario for the RTS-only intervention. Northern states average covers Kedah, Kelantan, Perak, Perlis, and Terengganu.

shock rather than a productivity shock. The RTS expands the effective reach of the corridor without sharply displacing production elsewhere. Nearby states remain tied to a larger Johor–Singapore market even as some population is drawn toward the corridor itself.

Real-wage gains are positive throughout but modest outside the corridor. This pattern is what one would expect from a reduction in effective distance. The RTS improves welfare mainly by raising access and lowering the cost of transacting within the corridor, not by materially altering the spatial distribution of productive efficiency across the wider system.

5.3 Joint Impact of JS-SEZ and RTS

In this section, we quantify the spatial impacts of the combined policies of SEZ and RTS: Johor receives a manufacturing productivity gain, Singapore receives a service-sector productivity gain, trade costs within the corridor fall, and migration costs between Johor and Singapore fall as well. The corridor is therefore both more productive and more accessible.

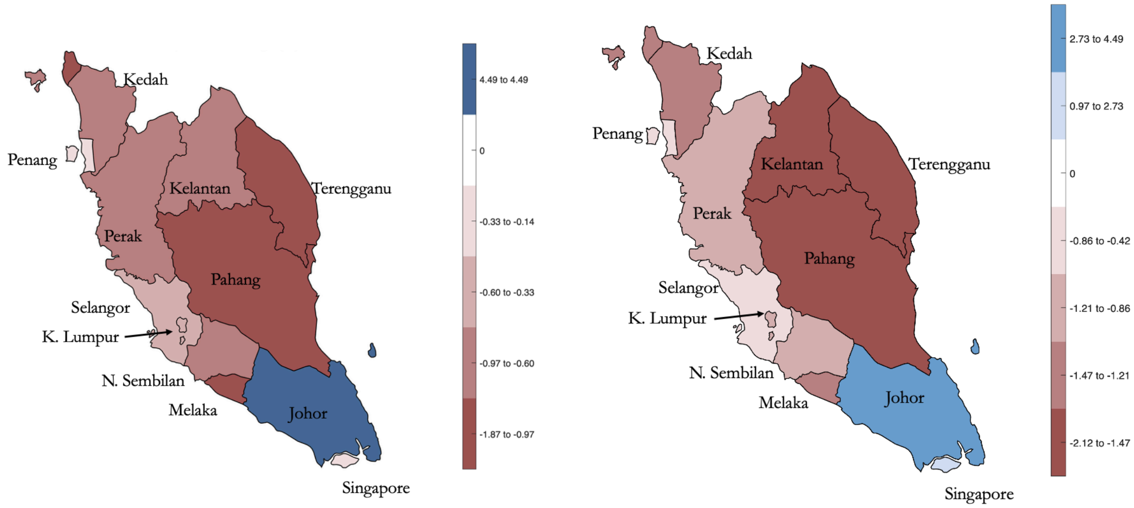
Table 3 summarises the quantitative results. Overall, the results are similar to those under the SEZ-alone exercise, except that the spatial heterogeneity of local impacts becomes more pronounced. The overall integration induces a welfare gain of 2.41 percent in Johor-Singapore corridor and of 0.13 (0.08) percent in neighbouring states (remote states). In terms of reallocation of economic activities, the corridor attracts 2.18 percent more of worker inflow and produces 2.73 percent more, while neighbouring states (remote states) lose 1.25 (0.79) percent workforce and 1.47 (1.17) percent production.

The neighbouring states are again central to the adjustment. Because access to Singapore on the migration margin is effectively channelled through Johor in the calibration, the immediate hinterland of the corridor is especially exposed when Johor becomes more attractive. Melaka, Negeri Sembilan, and Pahang therefore register larger declines than more distant states. The spatial pattern is thus not uniform across non-corridor regions. Figure 3 clearly visualises the spatial reallocation of output and population: the adjustment is strongest in the states closest to the expanding corridor and most directly connected to it through trade and migration.

Table 3: Joint impact of JS-SEZ and RTS by 2030 (%)

	GDP	Population	Real wage
Johor–Singapore corridor			
Johor	4.49	4.49	3.43
Singapore	0.97	-0.14	1.39
Average	*2.73*	*2.18*	*2.41*
Neighbours			
Melaka	-1.29	-1.18	0.16
Negeri Sembilan	-0.99	-0.71	0.11
Pahang	-2.12	-1.87	0.12
Average	*-1.47*	*-1.25*	*0.13*
Other states			
Kuala Lumpur	-0.91	-0.50	0.08
Pulau Pinang	-0.42	-0.33	0.13
Selangor	-0.86	-0.43	0.06
Northern states	-1.43	-1.01	0.07
Average	*-1.17*	*-0.79*	*0.08*

Notes: Entries report percentage changes under the lower-bound scenario for the joint JS-SEZ and RTS intervention. Northern states average covers Kedah, Kelantan, Perak, Perlis, and Terengganu.



(a) Population (b) GDP

Figure 3: Spatial impacts of the joint JS-SEZ and RTS policies (%)

Notes: these figures show the percent changes of regional population and output in the year 2030, driven by the joint policy of JS-SEZ and RTS.

As in the previous experiments, output and population become more concentrated in the corridor, but real wages continue to rise outside it (Figure 4). The model allows these two outcomes to coexist because welfare depends on the consumption rather than on local production alone. A stronger Johor–Singapore corridor lowers prices and improves access more broadly even as activity is drawn south. The joint experiment therefore implies a more uneven geography of production, but not a similarly uneven geography of welfare.

Notably, the impacts are stronger than the combined ones in either of the standalone experiments, suggesting that these two policies complement each other. For example, consider the real wage changes. Real wage in Johor increases by 1.65 percent with SEZ implementation alone and by 1.67 percent in standalone RTS. However, this impact becomes 3.43 percent under the bundle policy scenario, larger than the combined impacts from separate implementation ($3.43 > 1.65 + 1.67$). In fact, among the 3.43 percent welfare improvement, 48 percent is due to SEZ, 49 percent to RTS, and the remaining 3 percent to an interaction effect between the two policies. This result holds not only for Johor and real wage, but also for other states and other economic variables. Intuitively, the SEZ raises the return to locating production in Johor, but the extent of reallocation remains limited by trade and migration frictions. The RTS relaxes those frictions, but on its own does not create a strong new productivity wedge. When the two policies are combined, the corridor becomes both more attractive and easier to use. This combination amplifies the reallocation of output and population toward Johor–Singapore.

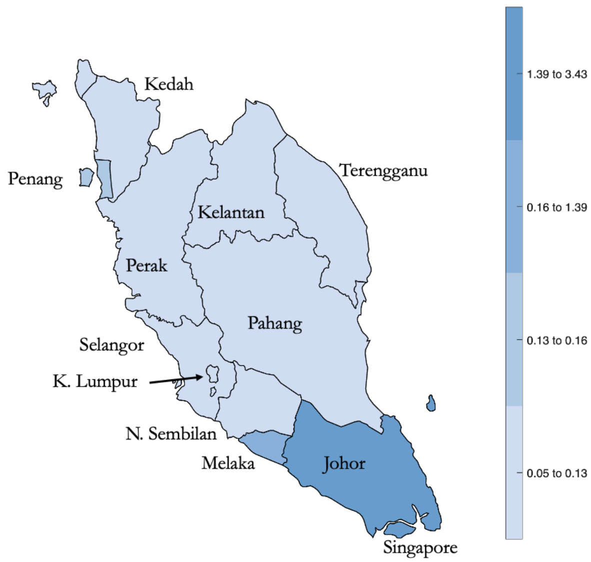


Figure 4: Change of real incomes in 2030

Notes: these figure show the percent changes of regional real income in the year 2030, driven by the joint policy of JS-SEZ and RTS.

5.4 Robustness

Lastly, we simulate scenarios where productivity shocks and trade cost reduction vary from the benchmark specification. In the lower-bound scenario, the JS-SEZ only increases Johor's manufacturing productivity by 1.5 percent and reduces manufacturing trade costs by 5 percent. In the upper-bound scenario, we adopt the most optimistic estimates: Johor's manufacturing productivity increases by 19 percent and manufacturing trade cost between Singapore and Johor falls by 18 percent. The corresponding quantitative results are reported in the appendix D.2.

The general patterns of the results are the same as in the benchmark scenario, but the magnitudes vary substantially. Overall, the JS-SEZ increases the corridor's average real income by $1.3 - 16.1$ percent, while the average income gain for the neighbours ranges from

0.06 to 0.88 percent. Adding the RTS pushes the corridor's average gain to $2.23 - 17.37$ percent, and the neighbours' gain to $0.16 - 1$ percent.

6 Internal Mobility and Long-Run Dynamics

6.1 Impacts with Reduced Internal Migration Frictions

Previous calibration results reveal significant migration barriers within Malaysia. Such barriers prevent workers in distant states from moving freely to the hot spot state such as Johor, and thereby limit the full potential gains from the policies. In this section, we ask whether reducing domestic migration barriers within Malaysia amplifies the gains from the joint policy of SEZ and RTS. Specifically, in both the baseline and counterfactual economy, the internal migration frictions in Malaysia drop by 30 percent from the initial period. In the counterfactual economy, the joint policy of SEZ and RTS induces exogenous changes in location fundamentals as in the previous experiment.

The reduction in migration frictions is best read as a comparative static for broader domestic integration rather than as the evaluation of any single transport project. In that sense, it provides a natural complement to the joint JS-SEZ and RTS scenario. While the baseline joint experiment lowers frictions within the Johor–Singapore corridor, this extension asks what the impacts of the joint policy are once mobility frictions fall more generally across Peninsular Malaysia. Ongoing rail upgrades, including the ECRL and the recent extension of ETS service to Johor Bahru, make this a useful margin to study, since they point in the direction of a more integrated domestic transport network even if they do not map one-for-one into the model.

The lower internal migration frictions convert the corridor shock into a much larger quantity adjustment, as suggested in table 4. Relative to the benchmark joint scenario (Table 3), Johor records substantially larger gains in both output and population (7.61% gains vs 4.49% in benchmark joint policy). This response is the natural implication of the model once the migration margin is relaxed. The joint JS-SEZ and RTS shock already raises the return to locating activity in the corridor. When internal migration costs fall more

Table 4: Policy impacts with reduced internal migration frictions (%)

	GDP	Population	Real wage
Johor–Singapore corridor			
Johor	7.61	7.61	2.86
Singapore	1.17	-0.84	1.43
Average	*4.39*	*3.39*	*2.15*
Neighbours			
Melaka	-0.57	-0.84	0.17
Negeri Sembilan	-0.78	-0.94	0.14
Pahang	-1.07	-1.04	0.10
Average	*-0.81*	*-0.94*	*0.14*
Other states			
Kuala Lumpur	-0.96	-0.99	0.11
Pulau Pinang	-0.36	-0.84	0.18
Selangor	-0.94	-0.98	0.11
Northern states	-1.17	-1.13	0.08
Average	*-1.01*	*-1.06*	*0.10*

Notes: Entries report percentage changes under the benchmark scenario with reduced internal migration frictions. Northern states average covers Kedah, Kelantan, Perak, Perlis, and Terengganu.

broadly, that return can be exploited by a larger set of workers across Malaysia. Johor is therefore able to draw labour from a wider domestic catchment area, and the expansion of output becomes more pronounced.

An important feature of the new results is that Johor's real-wage gain does not rise in the same proportion as its output and population. In the model, lower migration frictions increase the probability of moving toward high-value locations, so part of the incidence of the corridor shock shifts from prices to quantities. Easier internal mobility allows more workers to move into Johor, which expands local labour supply and moderates the increase in wages per resident even as total output rises sharply. The reduction in migration frictions therefore changes the form of adjustment. The baseline equilibrium delivers part of the corridor gain through higher local real wages. With lower internal frictions, more of that gain is absorbed through in-migration and production expansion.

The Singapore response fits the same logic. Output remains positive, but the population decline becomes larger, pointing to a sharper division of roles within the corridor.

Singapore continues to function as the high-productivity employment and service centre, while Johor absorbs a larger share of residential adjustment and production expansion on the Malaysian side. Once internal Malaysian mobility improves, access to the corridor can be capitalised more strongly into Johor rather than Singapore. Lower domestic frictions therefore strengthen Johor's role as the land-abundant side of an integrated cross-border system.

The neighbouring states of Melaka, Negeri Sembilan, and Pahang continue to lose output and population, so the corridor still draws activity from its immediate hinterland. At the same time, the declines are not markedly worse despite the much stronger expansion in Johor: the states' population only drops on average by 0.94 percent compared to 1.25 percent in the benchmark scenario. Intuitively, once internal migration frictions fall uniformly, Johor does not need to draw disproportionately from the neighbouring states alone. The pool of potential migrants becomes wider, and the corridor can recruit labour from a broader national market. Lower internal frictions therefore spread the adjustment margin more evenly across Malaysia rather than concentrating it entirely in the immediate hinterland of Johor.

The same point helps explain the responses in the more distant states. Kuala Lumpur, Penang, Selangor, and the northern states continue to record modest declines in output and population, but the magnitudes remain limited. What changes is not the direction of reallocation, but its efficiency. The economy can now move labour more easily toward the location where the combined JS-SEZ and RTS shock raises returns most strongly. In that sense, the uniform reduction in internal migration frictions strengthens the allocative response to the corridor shock.

Lastly, real wages remain positive outside the corridor. This pattern preserves one of the central implications of the earlier tables. Lower internal migration frictions make the geography of production more responsive, but they do not overturn the broader welfare gains generated by a stronger Johor–Singapore corridor. Workers in non-corridor states may lose some local activity, yet they continue to benefit from lower price indices and improved access to corridor output. The hypothetical reduction in internal migration frictions therefore sharpens the distinction between production incidence and welfare incidence. It yields a more mobile and more responsive spatial economy, one in which the Johor–Singapore corridor absorbs a larger share of national activity while the welfare gains remain more widely shared.

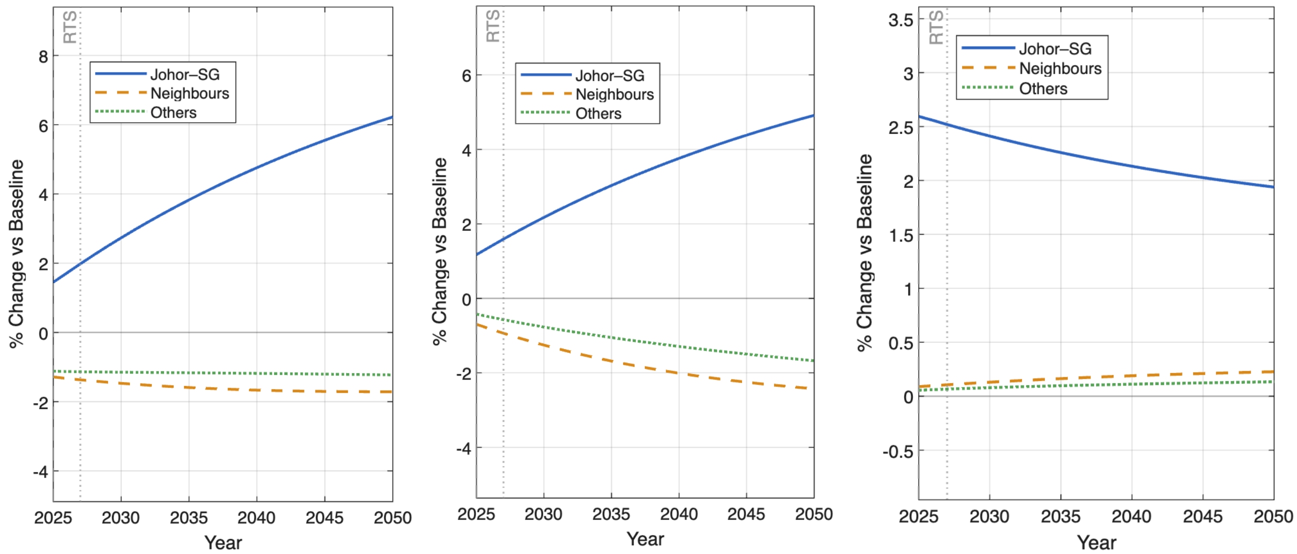
6.2 Impacts over Time

The dynamic model allows us not only to evaluate the spatial impacts of policy at a specific year, but also to inspect time trends of the impacts over a long timespan.

Figure 5 shows how the impacts of the joint policy evolve from its implementation through 2050. The long-run dynamics of spatial impacts reveal several notable patterns. Firstly, as shown in panels (a)-(b), the spatial reallocation effect strengthens over time. In particular, the Johor-Singapore corridor attracts more workforce and production activity in the long run than in the immediate years after the policy, while regions outside the corridor experience larger population losses in the long run. For instance, the policy-induced population growth in the corridor changes from around 2 percent in 2030 to 5 percent in 2050. These larger long-run impacts are actually a natural result of costly migration adjustments. Intuitively, population movement across states is costly and is a long-run process. A long time window thus allows workers to sufficiently adjust and choose the best location to live, in response to the policy shock.

Secondly, the initially large welfare gains in the Johor-Singapore corridor diminish over time, and become more broadly distributed across other regions (panel c). In this sense, welfare spillovers in the Malaysian states become increasingly significant over the long run. In particular, real wages in the neighbouring states rise by only around 0.1 per cent in 2030, but by around 0.3 per cent in 2050 — a threefold amplification. Such divergence in welfare impacts across different time horizons reflects the presence of trade frictions. As welfare gains spread across states through the frictional trade linkage, trade adjusts more adequately over a longer timespan, leading to stronger welfare spillover effects.

Lastly, the magnitude of policy impacts in neighbouring states is consistently larger than that in more distant states, and the gap between those two widens over time. This result again aligns with previous discussions that geographic conditions, such as migration and trade frictions, play a more important role in the long-run dynamics of spatial impacts.



(a) GDP (b) Population (c) Real Wage

Figure 5: JS-SEZ and RTS effects over time.

Notes: these figures show the average spatial impacts of geographic groups from year 2025 to 2050. ”Johor-SG” includes Johor and Singapore; ”Neighbours” includes Melaka, Negeri Sembilan, and Pahang; ”Others” includes all other Malaysian states in Peninsular Malaysia. The average changes for each group are the simple average.

7 Conclusions

This paper utilises a dynamic spatial general equilibrium model to evaluate recent Johor-Singapore economic integration measures, namely the Johor-Singapore Special Economic Zone (JS-SEZ) and Rapid Transit System (RTS). We ask not simply whether these policies benefit Johor and Singapore, but also how their effects spill over across the rest of Peninsular Malaysia. We summarise the main findings as follows:

1. **Gains concentrate in the corridor.** By 2030, Johor’s GDP and population each rise by 4.49 percent under the benchmark scenario, with real incomes up 3.43 percent. Singapore gains 0.97 percent in output and 1.39 percent in real incomes. No other region comes close on any of these margins (Table 3).

2. **Production and welfare have different geographies.** We observe spatial reallocation and welfare spillover at the same time: output and population shift south toward the corridor, but real incomes rise everywhere, including in states that lose activity.

A stronger Johor–Singapore corridor lowers prices and improves market access across the peninsula, so the welfare gains from integration are more widely shared than the reallocation of production suggests.

3. **The immediate neighbours experience the largest adjustments.** Melaka, Negeri Sembilan, and Pahang enjoy an average of 0.13 percent real income rise, but lose an average of 1.47 percent in output and 1.25 percent in population by 2030. Because of better trade and migration access to the corridor, these neighbouring states are disproportionately exposed when the corridor becomes more attractive.

4. **The SEZ and RTS reinforce each other.** The SEZ raises the return to locating in the corridor but is constrained by trade and migration frictions. The RTS relaxes those frictions but generates no strong productivity wedge on its own. Combined, the corridor becomes both more productive and more accessible, amplifying the reallocation of output and population beyond what either policy achieves alone.

Though the policies induce broad welfare improvements across the peninsula, they also displace population and production in other states, especially neighbouring ones. Policymakers should therefore be mindful of the spatial reallocation that place-based policies set in motion, and consider complementary measures such as lowering internal mobility barriers. Easing internal migration frictions across Malaysia would substantially amplify Johor's gains while sparing its neighbours from proportionally larger losses, as Johor would then draw labour from a wider national catchment rather than disproportionately from its immediate hinterland. Such a complementary policy package amplifies local economic gains without draining other states, and at the same time spreads the welfare improvements more evenly across space.

We acknowledge several limitations to our analysis. First, our quantitative spatial framework does not explicitly incorporate several potentially important channels, such as cross-border commuting, endogenous interregional capital flows, and the local housing market. Those omissions could have important implications for quantifying policy impacts. For example, adding localised housing markets can inject congestion in Johor following policy-induced population inflow, biding up the cost of living in Johor and dampening the welfare gains. Second, and more broadly, our results are derived from a quantitative spatial model and counterfactual simulations. The framework is necessarily an abstraction of reality and rests on a set of theoretical assumptions. This caveat should be borne in mind when interpreting the results and their policy implications.

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Appendix

A Additional Tables

Table A.1: List of Locations

Code	**Full location name**
01	Johor
02	Kedah
03	Kelantan
04	Melaka (Malacca)
05	Negeri Sembilan
06	Pahang
07	Pulau Pinang (Penang)
08	Perak
09	Perlis
10	Selangor
11	Terengganu
14	W.P. Kuala Lumpur
16	W.P. Putrajaya
99	Singapore

Notes: This table lists 13 state-level regions in West Malaysia plus Singapore.

B The Dynamic Spatial Model

B.1 Workers

In each period, workers derive flow utility from consumption across all sectors, $\ln\left[\prod_{j=1}^{J}\left(\frac{c^j}{\gamma^j}\right)^{\gamma^j}\right]$, where c^j is consumption of sector j goods, γ^j is workers' consumption share in sector j and satisfies $\sum_{j=1}^{2}\gamma^j = 1$. The sectoral consumption c^j is a constant elasticity of substitution (CES) consumption aggregator over N location-specific varieties, following Armington (1969):

$$c^j = \left[\sum_{i=1}^{N}\left(c_i^j\right)^{\frac{\theta}{\theta+1}}\right]^{\frac{\theta+1}{\theta}}, \quad \theta > 0,$$

where $\theta - 1$ is the elasticity of substitution across varieties and c_i^j is the amount consumed of the variety produced in location i sector j.

Workers supply one unit of labour inelastically each period and are employed full-time. They are freely mobile across sectors within the residing location so that sectoral wages are the same for each location. The workers consume all their income each period and do not save. At the end of each period, workers decide where to migrate for the next period, facing bilateral migration costs.

Accordingly, the worker's recursive problem follows the familiar form in Caliendo et al. (2019):

$$v_{it} = \ln\left(b_{it}\frac{w_{it}}{p_{it}}\right) + \max_{\{n\in N\}}\left\{\beta\mathbb{E}\left[v_{nt+1}\right] - \kappa_{ni,t} + \rho\varepsilon_{nt}\right\},$$

where v_{it} is the value of living in location i at time t. The first term on the right-hand side captures current indirect utility, with b_{it} representing exogenous local amenities (climate, scenery, local public service, etc.), w_{it} the wage rate, and p_{it} the ideal price index at location i as defined later.

The second term represents the expected continuation value, which depends on the location choice for the next period. The worker weighs the expected value of living in location n in period $t+1$, denoted $\mathbb{E}\left[v_{nt+1}\right]$, against the migration cost $\kappa_{ni,t}$.[16]

As is standard in dynamic discrete choice models, each worker draws an idiosyncratic preference shock $\{\varepsilon_{nt}\}_{n=1}^{N}$ that is independent across workers, locations, and time. The shock follows a Gumbel distribution with cumulative distribution function $F(\varepsilon) = e^{e^{(-\varepsilon-\bar{\gamma})}}$, where $\bar{\gamma}$ is the Euler–Mascheroni constant. The parameter ρ captures the dispersion of the Gumbel shock and can be interpreted as the inverse of the migration elasticity. Let $V_{it} = \mathbb{E}(v_{it})$ denote the expected value function. Then:

$$V_{it} = \ln\left(\frac{b_{it}w_{it}}{p_{it}}\right) + \rho\ln\left\{\sum_{n=1}^{N}\exp\left[\frac{\beta V_{n,t+1} - \kappa_{ni,t}}{\rho}\right]\right\}. \tag{B.1}$$

From the standard properties of discrete choice models, the probability that a worker in

[16]The bilateral migration cost $\kappa_{ni,t}$ satisfies standard properties: (1) $\kappa_{ni,t} > 0$ for $n \neq i$, (2) $\kappa_{ii,t} = 0$, and (3) the triangle inequality $\kappa_{ni,t} \leq \kappa_{nj,t} + \kappa_{ji,t}$ for any third location j.

i moves to n at time t is:

$$D_{ni,t} = \frac{\exp\left[(\beta V_{n,t+1} - \kappa_{ni,t})/\rho\right]}{\sum_{n'=1}^{N} \exp\left[(\beta V_{n',t+1} - \kappa_{n'i,t})/\rho\right]}, \tag{B.2}$$

where $1/\rho$ is the semi-elasticity of migration. Finally, the population of workers in each location evolves according to:

$$L_{n,t+1} = \sum_{i=1}^{N} D_{ni,t} L_{it}. \tag{B.3}$$

B.2 Production and Trade

The production side of the model for each sector follows a standard Armington setup (Armington, 1969). Firms in each sector j location i produce a single differentiated variety and operate in a perfectly competitive market. Production in sector j uses only labour L_{it}^{j} as input:

$$y_{it}^{j} = z_{it}^{j} L_{it}^{j},$$

where z_{it}^{j} denotes location-specific exogenous productivity in sector j.

We assume standard *iceberg* trade costs between locations: to deliver one unit of a variety from location i to location n, a firm in i must ship $\tau_{ni,t} \geq 1$ units. The consumer price in n of a variety produced in i is therefore

$$p_{ni,t}^{j} = \tau_{ni,t}^{j} \left(\frac{w_{it}}{z_{it}^{j}} \right),$$

where w_{it} is the wage rate in location i. Given the nested preferences over all varieties, the ideal price index in location n is

$$p_{nt} = \prod_{j=1}^{J} \left(p_{nt}^{j} \right)^{\gamma^{j}}, \tag{B.4}$$

where the sector-specific price index is

$$p_{nt}^{j} = \left[\sum_{i=1}^{N} \left(\frac{\tau_{ni,t}^{j} w_{it}}{z_{it}^{j}} \right)^{-\theta} \right]^{-1/\theta}, \tag{B.5}$$

where $\theta > 0$ is the elasticity of substitution across varieties. Finally, for each sector j, the share of importer n's total expenditure spent on goods from exporter i is

$$\pi_{ni,t}^{j} = \frac{(p_{ni,t}^{j})^{-\theta}}{\sum_{m=1}^{N} (p_{nm,t}^{j})^{-\theta}}. \tag{B.6}$$

This trade-share expression follows directly from CES demand and captures how bilateral trade costs, wages, and productivity jointly determine trade flows across locations.

B.3 Equilibrium

Dynamic Equilibrium. Given initial conditions $\{L_{i0}\}$ in each location, the dynamic equilibrium contains a sequence of location-specific wages $\{w_{it}\}_{t=0}^{\infty}$ and population $\{L_{it}\}_{t=0}^{\infty}$, such that the population allocation conditions (B.1)(B.2)(B.3) and the following market clearing conditions hold in all locations and time periods:

$$w_{it} L_{it} = \sum_{j=1}^{J} \sum_{n=1}^{N} \pi_{ni,t}^{j} \gamma^{j} \left(w_{nt} L_{nt} \right). \tag{B.7}$$

The economy's steady state is a dynamic equilibrium when all the exogenous fundamentals of the economy and endogenous variables stay constant over time:

Steady State. A steady state of the economy is an equilibrium in which the endogenous variables are constant over time: $\{w_i^*, V_i^*, L_i^*\}$.

C Data and Calibration Procedure

In this section, we provide details on the data and calibration procedure to recover time-invariant location fundamentals, and omit the time subscript in the notation for clarity.

C.1 External Calibration

Parameters from the Literature Following spatial economics literature, we choose the trade elasticity $\theta = 5$ from Costinot and Rodríguez-Clare (2014). We assume a typical annual discount rate of $\beta = 0.97$. Migration elasticity is $\rho = 3\beta$, following Kleinman et al. (2023).

Trade Costs We assume the service trade costs to be infinite for location pairs where services are non-tradable, and the same as the manufacturing trade costs for location pairs where services are tradable. To compute bilateral trade costs τ_{ni} in manufacturing[17] between Malaysian states, we use road transportation time between the capitals of the respective states. Since we only observe data on road transportation time, we consider road transportation to be the only viable mode between states within the peninsula.[18] The road travel time is extracted from OpenStreetMap's road network data. We then convert the road transportation time to trade costs using the elasticity and costs parameters estimated in Ma and Tang (2020), with the following formula:

$$\tau_{ni} = \frac{1}{\theta_T}\Gamma\left(\frac{1}{\theta_T}\right)\left[\exp\left(-a \times d_{ni} - b\right)\right]^{-\frac{1}{\theta_T}},$$

where d_{ni} is the freight transportation time from i to n, θ_T is the transportation mode elasticity, and a and b are cost parameters for road transportation. The equation above can be micro-founded using a discrete choice model across modes of transportation, as discussed in detail in Allen and Arkolakis (2014).

The trade cost between Singapore and each Malaysian state depends not only on bilateral transportation time, but also on national barriers such as customs clearance procedures and

[17] We drop the sector superscript for brevity as the manufacturing trade costs are the only trade costs required to estimate.

[18] This assumption necessarily has implications for quantitative results. Places in the peninsula, such as Penang and Selangor, are well-connected to the Johor-Singapore corridor through maritime logistics. Omitting trade by sea route potentially overestimates trade costs between those states and the corridor. Consequently, we may underestimate the policy impacts for those states.

tariffs. Thus, we assume the cost between Singapore and state i as

$$\tau_{sg,i} = \bar{\tau}_{sg,my} \times \bar{\tau}_{sg,i} \text{ with } \tau_{sg,i} = \tau_{i,sg}, \tag{C.1}$$

where $\bar{\tau}_{sg,my}$ captures the national trade barriers between Singapore and Malaysia and $\bar{\tau}_{sg,i}$ captures the state-specific trade costs with Singapore. We calibrate $\bar{\tau}_{sg,my}$ and $\bar{\tau}_{sg,i}$ in equilibrium by matching observable trade share data, as discussed in more detail in the next section.

Migration Costs To compute migration costs across states within Malaysia, we use the inter-state migration flow data obtained from the 2022 Migration Survey Report, Malaysia, at the Department of Statistics Malaysia (DOSM). The survey provides yearly bilateral migration flows across states, with the origin and destination states explicitly specified. We start with the migration equation (1) and assume symmetry of migration costs $\kappa_{ni} = \kappa_{in}$. Double-differencing equation (1) and rearranging yields the following structural equation:

$$\kappa_{ni} = -\frac{\rho}{2} \log \left(\frac{D_{ni}}{D_{ii}} \frac{D_{in}}{D_{nn}} \right), \tag{C.2}$$

where D_{ni} is the migration share of people living in state i who choose to move to state n at the year 2020. The migration share can be directly computed from the 2020 migration flow data. Conditional on the externally calibrated ρ, using the above equation solves migration costs.

Regarding the migration costs between Singapore and each Malaysian state, we also incorporate a national barrier component in addition to the state-specific migration costs, similar to the case of international trade costs. Specifically, we assume the migration cost between Singapore and state i is given as

$$\kappa_{sg,i} = \bar{\kappa}_{sg,my} + \kappa_{jh,i}, \tag{C.3}$$

where $\bar{\kappa}_{sg,my}$ is the national barrier between Singapore and Malaysia that captures all institutional and psychological factors, such as visa requirements or the disutility of separation from origin. The second term $\kappa_{jh,i}$ is the moving cost from state i to the state of Johor, the state closest to Singapore. As such, we essentially assume that a worker living in state i who plans to move to Singapore first needs to move to Johor and then cross the national boundary to arrive in Singapore. To compute the national barrier $\bar{\kappa}_{sg,my}$, we again utilise the structural equation (C.2), but with Singapore and Malaysia as the locations of interest. The country-level migrant shares are computed from migration data in 2000, the latest year available, from the Global Bilateral Migration database at the World Bank.

C.2 Calibration in Equilibrium

In the previous step, we have recovered trade costs within Malaysia and migration costs. The remaining unknown parameters are manufacturing trade costs between Singapore and each state, $\tau_{sg,i}$, each location's productivity z_i, and local amenity b_i. In the second step, we calibrate $\{\tau_{sg,i}\}_{i\neq sg}$ and $\{z_i^j\}_{i=1}^N$ in the initial equilibrium at the year 2019. Then the last calibration step solves the amenity b_i in the transition path.

Calibration in Initial Equilibrium We define the static equilibrium at the initial year 2019 as the initial equilibrium. We do not need to assume that the initial static equilibrium is in a steady state; instead, the initial equilibrium in 2019 is on a transition path towards a long-run steady state. In the initial equilibrium calibration, we calibrate the local fundamentals by matching corresponding observable data moments. In particular, to uncover the location productivity in each sector, $\{z_i^j\}_{i=1}^N$, we first calibrate the average productivity $\bar{z}_i$ for each location by matching model implied GDP shares of each location and their data counterparts in the initial year. Then assuming that the sectoral productivity is proportional to sectoral output $z_i^s = \frac{GDP_i^s}{GDP_i^m} z_i^m$ and using the assumption $(z_i^m + z_i^s)/2 = \bar{z}_i$ yield the sectoral productivities z_i^j, where GDP_i^j is the 2019 output share in sector j location i observed in data. The national trade barriers between Singapore and Malaysia, $\bar{\tau}_{sg,my}$, are calibrated to match Malaysia's national trade-to-output ratio, a ratio of Malaysia's bilateral trade volume with Singapore to Malaysia's GDP in 2019. The state-specific trade barriers with Singapore, $\bar{\tau}_{sg,i}$, are calibrated to match each state's trade share out of Malaysia's total trade with Singapore.

The observable data moments come from several data sources. The Malaysian state-level GDPs in each sector are from the Department of Statistics Malaysia (DOSM). The DOSM provides GDP data across six sectors at the 1-digit classification level. We exclude the sector of Import duties, and aggregate the Agricultural sector and the Manufacturing sector as a tradable sector in the model, which we simply refer to as the ”manufacturing sector”. The non-tradable service sector in the model consists of Mining and quarrying, Construction, and the Service sector[19]. The country-level GDPs of Malaysia and Singapore are from the National Accounts data, Penn World Table. International trade volume data between Malaysia and Singapore comes from the 2019 OECD's Inter-Country-Input-Output (ICIO) table. The Malaysian state-level trade data with Singapore comes from the Malaysia External Trade Statistics by State 2022 from DOSM.

Practically, to calibrate the fundamentals in the initial equilibrium, we start with an initial guess for them. Given the initial population allocation[20] at each location, and conditional on the initial guess, solving the initial static equilibrium is equivalent to finding a vector of factor prices $\{w_i\}_{i=1}^N$ that clears each location's goods and factor markets in the first period. After solving the initial equilibrium, we can obtain the simulated location GDP shares, trade to output ratio, and the state's trade share with Singapore. Matching the simulated moments with the observed data moments over iterations solves the location fundamentals.

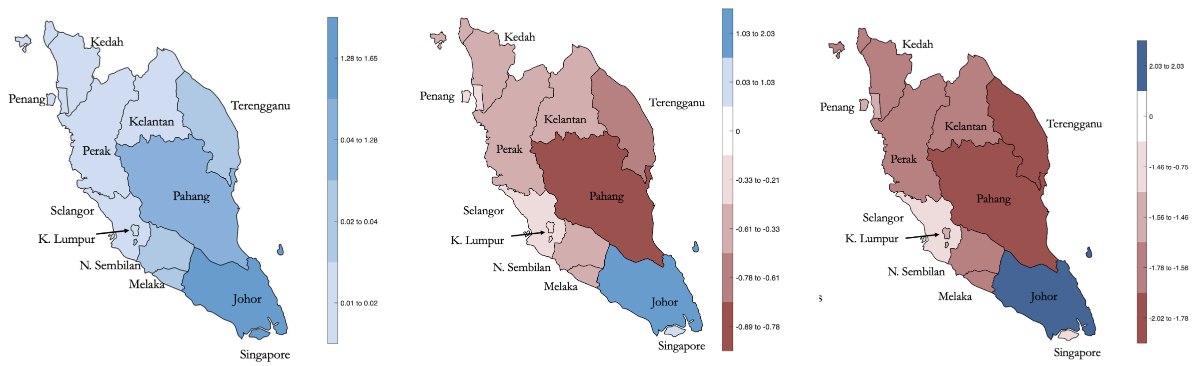
Calibration in Path In the last step, we condition on all previously recovered parameters and calibrate the location amenity $\{b_i\}_{i=1}^N$ by solving the transition path, as the amenity governs the forward-looking migration decisions, and thus simulating people's movement requires future information. We calibrate the amenities by matching the model-simulated population distribution at year 2024 with the observed population distribution from data in the same year.

[19]This sector classification is admittedly a simplification, as not all services are non-tradable in practice. Nevertheless, it serves as a reasonable approximation when mapping observed total output to the structure of the model.

[20]State-level population data in 2019 Malaysia come from DOSM; Country-level population in 2019 are from World Development Indicators at World Bank.

D More on Quantitative Results

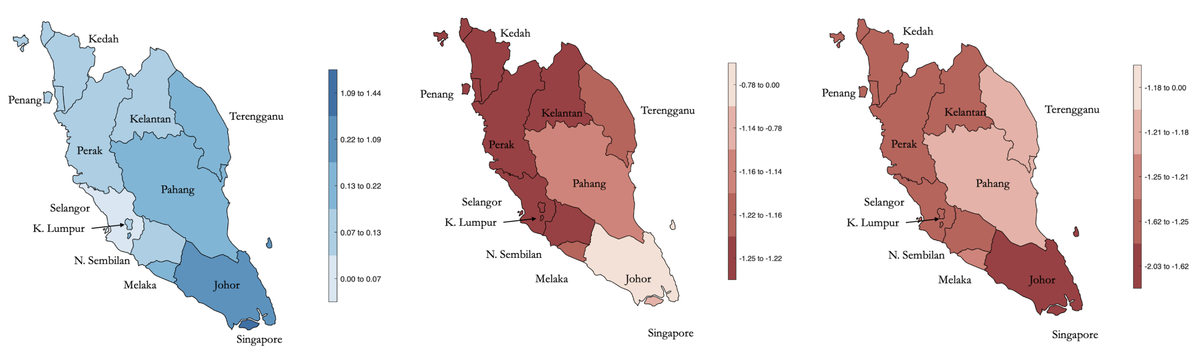
D.1 More Details on the Main Findings



(a) Real Wage (b) Population (c) GDP

Figure D.1: Spatial impacts of the JS-SEZ (%)

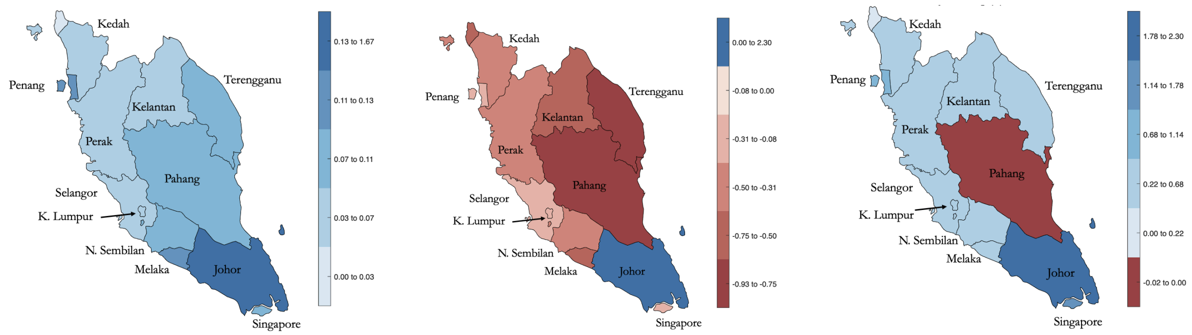
Notes: these figures show the spatial impacts of JS-SEZ alone on regional population and output in the year 2030.



(a) Welfare (b) Nominal Wage (c) Cost of Living

Figure D.2: Spatial impacts of the JS-SEZ on Welfare (%)

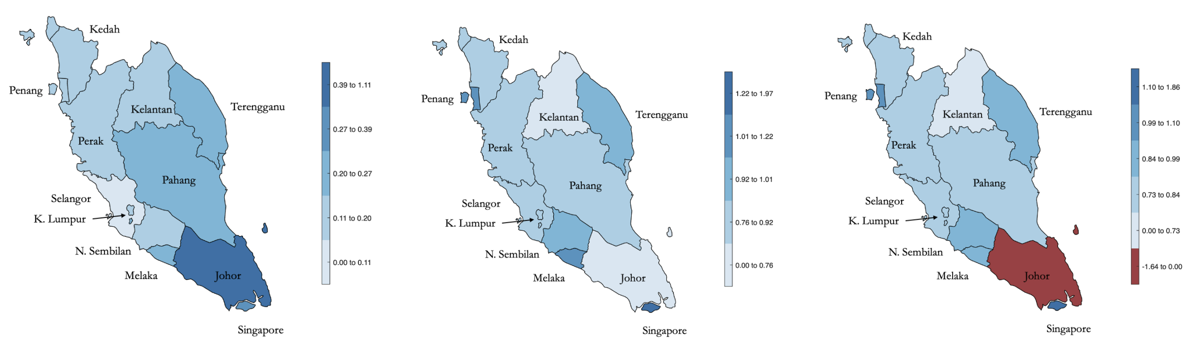
Notes: these figures show the spatial impacts of JS-SEZ alone on the alternative welfare measure,V_{it}, and the components of real income.



(a) Real Wage (b) Population (c) GDP

Figure D.3: Spatial impacts of the RTS (%)

Notes: these figures show the spatial impacts of RTS alone on regional population and output in the year 2030.



(a) Welfare (b) Nominal Wage (c) Cost of Living

Figure D.4: Spatial impacts of the RTS on Welafare (%)

Notes: these figures show the spatial impacts of RTS alone on the alternative welfare measure, V_{it}, and the components of real income.

D.2 Robustness Checks

D.2.1 Impacts of JS-SEZ

Table D.1: Spatial impacts of JS-SEZ in 2030 (%)

(a) Lower-bound Quantification

	GDP	Population	Real wage
Johor–Singapore corridor			
Johor	1.64	1.64	1.36
Singapore	-0.32	0.05	1.24
Average	*0.66*	*0.84*	*1.30*
Neighbours			
Melaka	-1.33	-0.46	0.07
Negeri Sembilan	-1.21	-0.28	0.05
Pahang	-1.67	-0.74	0.05
Average	*-1.40*	*-0.49*	*0.06*
Other states			
Kuala Lumpur	-1.19	-0.20	0.04
Pulau Pinang	-0.98	-0.13	0.06
Selangor	-1.17	-0.17	0.03
Northern states	-1.40	-0.40	0.03
Average	*-1.29*	*-0.31*	*0.03*

(b) Upper-bound Quantification

	GDP	Population	Real wage
Johor–Singapore corridor			
Johor	21.22	21.22	16.66
Singapore	-1.44	0.54	15.50
Average	*9.89*	*10.88*	*16.08*
Neighbours			
Melaka	-13.37	-5.54	1.07
Negeri Sembilan	-12.45	-3.63	0.80
Pahang	-17.31	-8.68	0.75
Average	*-14.37*	*-5.95*	*0.88*
Other states			
Kuala Lumpur	-12.40	-2.71	0.59
Pulau Pinang	-9.55	-1.76	0.97
Selangor	-12.17	-2.39	0.52
Northern states	-14.82	-5.21	0.47
Average	*-13.53*	*-4.11*	*0.55*

Notes: Panel (a) reports percentage changes under the lower-bound scenario for the JS-SEZ-only intervention (5% trade cost reduction and 1.5% productivity gain); Panel (b) reports under the upper-bound scenario (18% trade cost reduction and 19% productivity gain). Northern states average covers Kedah, Kelantan, Perak, Perlis, and Terengganu.

D.2.2 Joint Impacts of JS-SEZ and RTS

Table D.2: Joint impact of JS-SEZ and RTS in 2030 (%)

(a) Lower-bound Quantification

	GDP	Population	Real wage
Johor–Singapore corridor			
Johor	4.06	4.05	3.12
Singapore	1.43	-0.12	1.35
Average	*2.74*	*1.97*	*2.23*
Neighbours			
Melaka	-0.80	-1.02	0.19
Negeri Sembilan	-0.59	-0.62	0.14
Pahang	-1.74	-1.71	0.13
Average	*-1.04*	*-1.12*	*0.16*
Other states			
Kuala Lumpur	-0.59	-0.45	0.10
Pulau Pinang	0.09	-0.23	0.18
Selangor	-0.54	-0.39	0.08
Northern states	-1.13	-0.95	0.08
Average	*-0.83*	*-0.73*	*0.10*

(b) Upper-bound Quantification

	GDP	Population	Real wage
Johor–Singapore corridor			
Johor	25.56	25.56	19.04
Singapore	0.42	0.52	15.69
Average	*12.99*	*13.04*	*17.37*
Neighbours			
Melaka	-13.33	-6.55	1.22
Negeri Sembilan	-12.27	-4.38	0.92
Pahang	-17.81	-10.08	0.86
Average	*-14.47*	*-7.01*	*1.00*
Other states			
Kuala Lumpur	-12.19	-3.29	0.68
Pulau Pinang	-8.93	-2.23	1.11
Selangor	-11.92	-2.93	0.59
Northern states	-15.00	-6.19	0.54
Average	*-13.50*	*-4.92*	*0.63*

Notes: Panel (a) reports percentage changes under the lower-bound scenario for the joint policy of JS-SEZ and RTS intervention (5% trade cost reduction and 1.5% productivity gain); Panel (b) reports under the upper-bound scenario (18% trade cost reduction and 19% productivity gain). Northern states average covers Kedah, Kelantan, Perak, Perlis, and Terengganu.