Should gains from trade be redistributed at the national or regional level?

Extended Abstract

Geoffroy Duparc-Portier[*], Gioele Figus[*], Peter McGregor[*], and Graeme Roy[**]

[*]Department of Economics, University of Strathclyde

[**]Adam Smith Business School, University of Glasgow

January 23, 2024

Keywords: Trade liberalisation, Income redistribution, Regional inequality

JEL Codes: C68, D58, R12, R15

This research has received funding from the Economics And Social Sciences Research Council, Centre for Inclusive Trade Policy [grant number ES/W002434/1].

1 Introduction

Trade economists have long supported openness to international trade for economic welfare (Frankel and Romer, 1999; Romer, 1990; Dollar and Kraay, 2002; Eaton and Kortum, 2002; Winters, 2004; Atkin et al., 2017). However, it is widely recognised that the benefits of trade openness are often unevenly distributed, and that liberalisation may lead to winners and losers. Distributional concerns in the literature have typically focused on the distribution of income within a single nation. A more neglected but still crucial concern is the distribution among households within regions of a nation.

An academic debate focusses on whether governments should intervene to redistribute trade gains (see for instance Spector, 2001; Egger and Kreickemeier, 2009; Antràs et al., 2017; Lyon and Waugh, 2019). Different scholars offer varying perspectives on this issue. Spector (2001) argues that in a small open economy, governments may lose their ability to redistribute income due to limited policy options. Using a stylized theoretical framework, the author shows that equalisation of skilled and unskilled workers' wages through net transfers may no longer be feasible in an open economy as prices, and consequently wages, are determined in world markets. Egger and Kreickemeier (2009) suggest that redistributive measures can be welfare-improving, maintaining trade gains, especially if a significant share of the economy involves exporting. Antràs et al. (2017) find that trade-induced inequality effects may lead to a loss of around 20% of trade's

welfare gains in the US. Migration frictions also play a role in determining optimal redistribution following trade liberalisations (Lyon and Waugh, 2019).

While some existing literature explores the impacts of trade liberalisation and income redistribution between regions, few consider the interplay between regional and distributional impacts. However, the issue may be particularly significant for countries where regional inequality is particularly high. In this case, any national trade policy that impacts incomes at a national level may in turn have positive or negative implications for regional inequalities. For this reason, this paper aims to fill this gap by examining the distributional and regional effects of trade liberalisation and to explore the impact of post-liberalisation redistributive policies at the national and regional levels.

The paper has three main aims. The first is to assess the spatial and distributional impacts of a reduction in bilateral trade barriers. The second aim is to assess the extent to which governments can redistribute the gains from trade through income-neutral redistributive policies following trade liberalisation. The third aim is to compare the implications of redistributive policies at a national and regional level. In doing this we use the UK as an example. The UK makes the ideal example for this as it has been defined as "one of the most interregionally unequal countries in the industrialised world" (McCann, 2020, p.265). The country is also undertaking a radical shift in trade policy with the decision to leave the European Union and has

simultaneously been conducting policies to “level up” regional inequality.

2 Methodology

To assess the spatial and distributional effects of trade liberalisation, we develop and apply a multi-regional dynamic general equilibrium trade model for the UK, known as UKGE. This model, calibrated using PB EUREGIO Input-Output tables at the ITL1 level, encompasses 13 industries (Thissen et al., 2018).[1] The modelling approach allows us to capture the ramifications of a change in trade policy through both supply chains and income distribution. In addition, it allows us to compare the general equilibrium implications of redistributive policies in a controlled environment.

The model depicts the production activities of these industries, each comprising a continuum of firms producing differentiated goods based on the Dixit and Stiglitz (1977) framework. Firms utilise capital, "high-skill" and "low-skill" labour[2], and intermediate inputs sourced either domestically or imported from other regions or the rest of the world to generate output.

In each region, household final demand and income are categorised into five representative income quintiles. These household groups supply skilled or unskilled labour to industries, own a share of capital, receive govern-

[1] A brief description of the model is provided in this extended abstract. The model will be described in detail in the full paper.

[2] These are defined in terms of qualification level.

ment transfers, pay taxes, and save. Income is spent on goods and services produced either within the region, imported from other UK regions, or sourced globally. Consumption patterns and income distribution vary among household groups; for example, lower-income households rely more on government transfers, while higher-income groups derive more income from capital.

A central government collects revenue through taxes from each region and establishes income tax rates. Region-specific income tax rates can be configured to reflect either a scenario where each region has fiscal independence or a national devolved government setting tax rates for each region. Differential income tax rates across regions can also be linked to the idea of "levelling up" and to more traditional regional redistributive policies.

3 Simulation strategy

We model a simple illustrative trade liberalisation as a price equivalent reduction in bilateral trade costs of 5% between the UK and rest of the world (ROW). Following liberalisation, we explore two distributional policies as summarised below.

The **national redistribution** policy's objective is to restore the pre-

Redistribution	Objective variable	Government	Constraint
National	National Gini coefficient	National	National
Regional	Regional Gini coefficient	Regional	Regional

Table 1: Summary of the Redistribution Scenarios

liberalisation national Gini coefficient[3]. This can be interpreted as a national government redistributing the gains from trade to meet national policy goals. The **regional redistribution** policy's objective is to regain the pre-liberalisation regional Gini coefficients. This can be interpreted as a fiscal federalism system or a national government setting policies at a regional level to meet regional policy goals.

4 Results

All results presented represent the long run, over which all factors of production have fully adjusted.

4.1 Trade liberalisation

Figures 1 and 2 present the aggregated and distributional impacts of trade liberalisation using a box and whiskers plot. The central line in each box represents the mean of the given variable across the twelve UK regions. Each of the boxes represents the interquartile range whereas the whiskers present the 95% confidence interval of the variables. Dots extending beyond the whiskers are outliers given the regional distribution of results.

[3]The Gini coefficient is defined over after-tax income.

4.2 Trade liberalisation – Aggregate impacts

Following trade liberalisation, bi-lateral trade costs between the regions of the UK and the ROW fall. This has both demand-side and supply-side effects. On the demand side, households increase their consumption of goods and services from ROW whilst consumers from ROW increase their demand for goods from the UK regions.

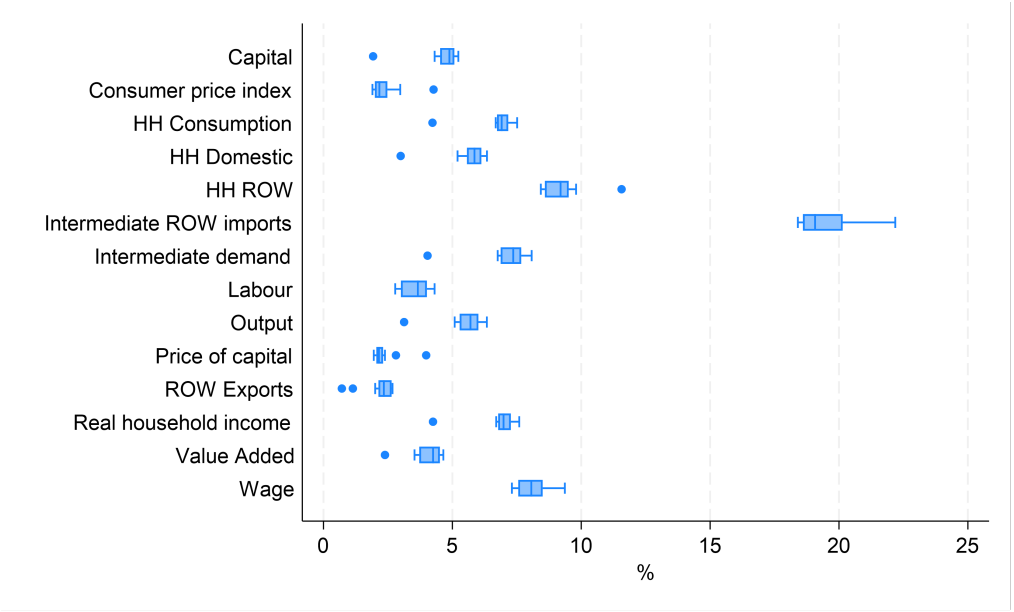

Figure 1: Regional dispersion in aggregate variables

On average, UK household consumption increases by 6.8% reflecting a 9.2% increase in household imports and 5.6% increase in domestic consumption. Exports increase by 2.2% as the additional domestic demand stimulates wages and prices and partially crowds out the benefits from reduced trade barriers.

As ROW demand for domestic goods increases whilst prices of imported

intermediate goods fall, domestic firms increase output by 5.5%. Intermediate demand increases by 7.1% and this includes a 19.5% increase in foreign intermediate imports. Value-added increases by 4.0% on average with labour and capital increasing by 3.6% and 4.6% respectively.

With a higher demand for labour and capital, wages and capital rental rates increase by 8.1% and 2.3%. The consumer price index increases by 2.4%. Real wages increase by over 5% on average whilst real rental rates of capital decrease by 0.1%. The increase in real wages combined with increases in labour and capital demand lead to a 6.8% increase in real household income.

Whilst on aggregate trade liberalisation has expansionary effects benefiting both industries and households, Figure 1 clearly shows that the impacts are heterogeneous across regions and income.

The distribution of impacts on household groups is presented in detail in Figure 2. A clear pattern emerges: the trade liberalisation has expansionary and regressive effects across the income distribution. Indeed, except for the top quintile, the pattern in consumption and income is of increasing inequality.

The regressive effect on real income is driven by two factors. The first is the composition of income. The proportion of government transfers to total household income is decreasing in the income distribution, however labour

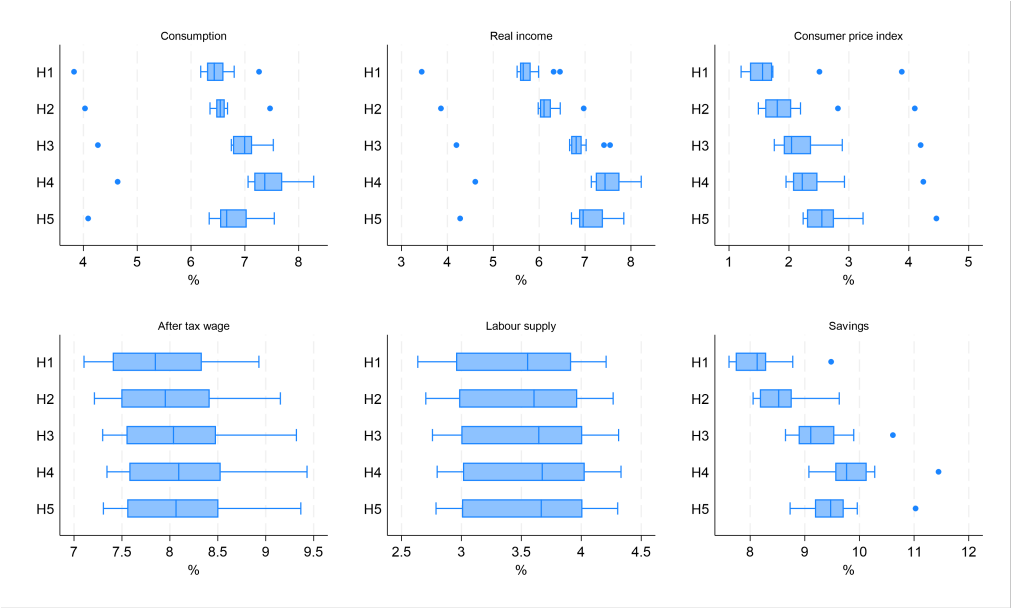

Figure 2: Box and Whiskers plot of regional dispersion in household variables

income increases in the income distribution. This is because government transfers only increase in line with the CPI whereas labour income increases with wages. The second is a skills composition effect. High-income households supply proportionately more skilled workers, whose wages increase by 0.5 pp more than low-skill workers.

Overall, the trade liberalisation leads to a 0.6% increase in the national Gini coefficient (measured in terms of net household incomes). As can be seen in Figure 3 inequality increases in all regions. However, regions such as the North East and Yorkshire and the Humber face much larger increases in regional inequality than regions such as London, Scotland and Northern Ireland.

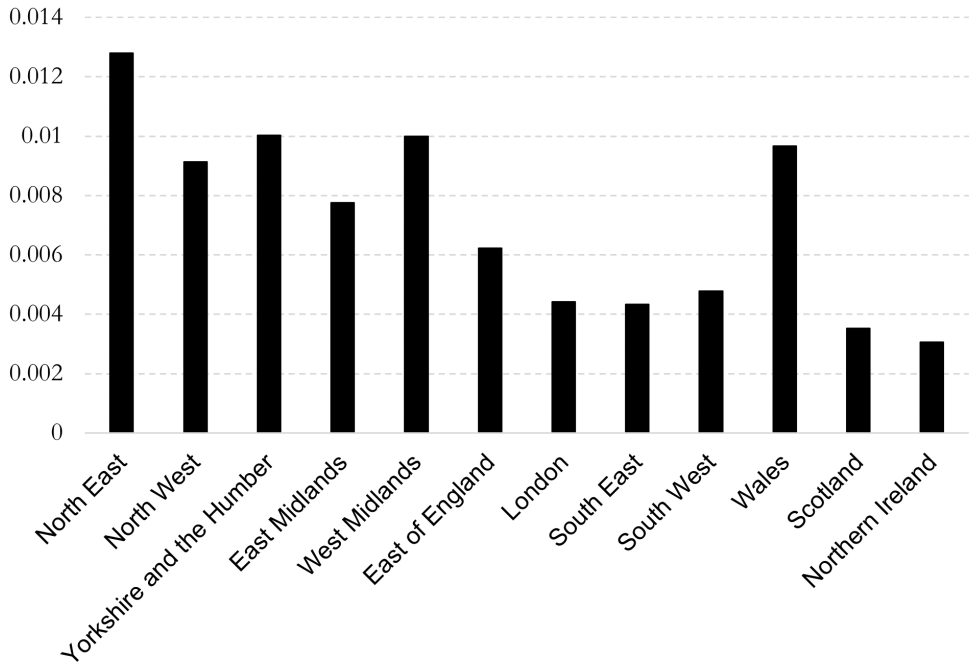

Figure 3: Change in regional Gini coefficients

4.3 National redistributions

Following the expansionary but regressive effects of the trade liberalisation, the UK government may choose to introduce redistributive policies to improve equity at a national level. Recall that for simplicity and ease of exposition, we consider one possible objective, namely that the UK government wishes to re-allocate the gains from trade such that the national distribution achieves the pre-liberalisation national Gini coefficient using income taxation.[4]

[4]Note that UKGE has a simplified representation of the UK tax system and does not distinguish between taxes by income source, nor does it distinguish between national

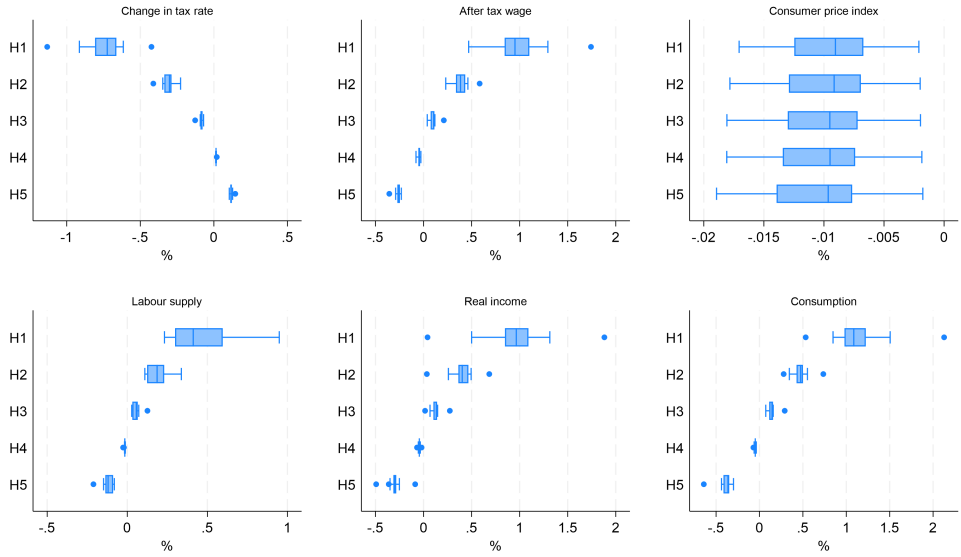

Figure 4: Box and Whiskers plot of regional dispersion in household national redistribution changes

Figure 4 presents impacts on key households' indicators. To regain the national Gini coefficient, the UK government increases taxes on income of the top two quintiles by on average 0.12 and 0.02 percentage points respectively across the regions. This increase enables the government to reduce the tax rate on households in the three bottom quintiles by 0.09, 0.30 and 0.74 percentage points respectively. As a result, after tax wages in the top two quintiles decrease whilst increasing for the bottom three quintiles. As expected, labour supply moves synchronously with the after-tax wage. The income redistribution has progressive effects and increases consump-

taxes and regionally allocated taxes such as Council tax – which is the largest proportion of the first quintile's tax liability.

tion and real incomes for the lower-income household groups.

Importantly, tax rate changes to support national redistribution have relatively large regional variation. This is driven by the fact that regional distributions are heterogeneous. Hence, a given bi-lateral reduction in inequality may necessitate very different tax rates depending on the initial inequality. For instance, the first quintile in London receives a 1.1% reduction in its tax rate whereas the equivalent quintile in Wales only receives a 0.4% reduction. Consequently, the national redistribution favours redistribution in regions with higher initial Gini coefficients.

The redistribution has expansionary demand side effects and contractionary supply side effects. On the demand side, redistributing income from higher-income to lower-income households lead to a higher aggregate marginal propensity to consume. This is so since lower-income households consume a higher proportion of their incomes and thus, a higher proportion of the redistributed income is used for final consumption instead of savings.

On the supply side, reductions in savings decrease the economies' capital stock whilst changes in relative wages alter the composition of the labour market. That is, through increased taxation, high-income households decrease their labour supply whilst low-income households increase their labour supply with lower taxes. Although households in quintiles 1-3 pay less taxes and thus receive higher after-tax wages, the reduction in high-income households' labour supply is larger than the increase in

labour supply by lower-income households. This is driven by the fact that higher-income households supply more highly skilled labour which is only imperfectly substitutable with lower skill labour supplied by the lower income households.

Overall, the income redistribution has a very small aggregate national cost in terms of output and real income of about 0.04 percentage points in both cases relatively to a no redistribution scenario. However, this cost varies at a regional level.

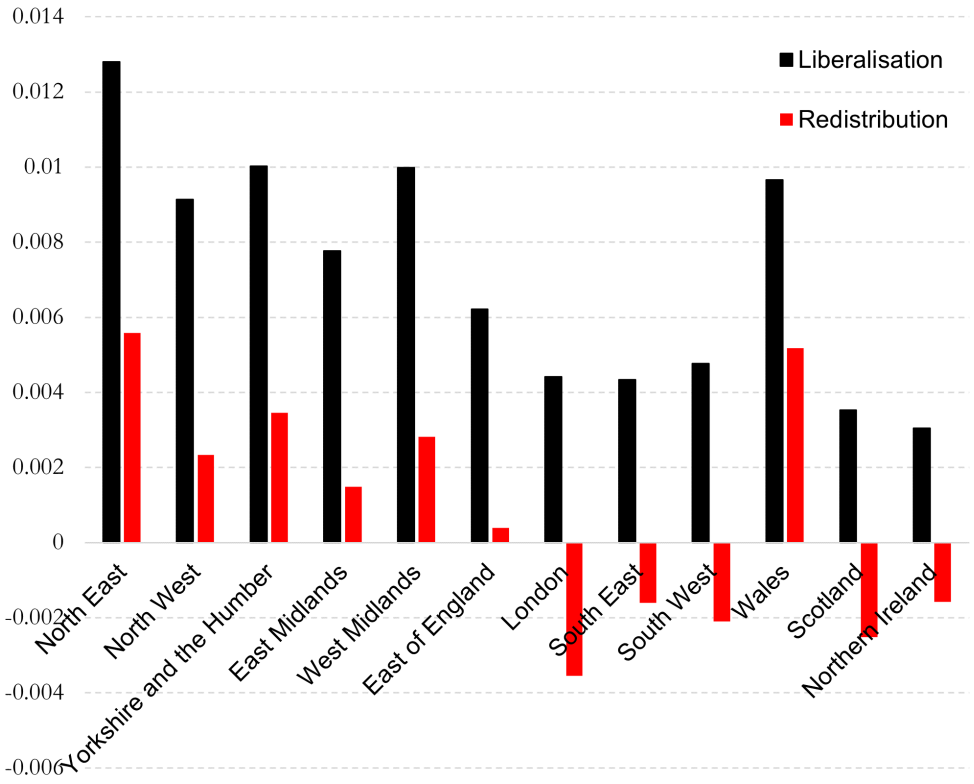

Figure 5: Change in regional Gini coefficients

From Figure 5, it is clear that the (nationally motivated) redistribution does improve the Gini coefficient in every region relative to the post liberalisation outcome. However, the extent varies significantly among regions. Despite the reduction in the national Gini coefficient to its pre-liberalisation level, regional Gini coefficients in many cases remain higher than their pre-liberalisation baselines. Indeed, regions which were initially less affected by the trade liberalisation witness reductions in their regional Gini coefficients whereas regions which were more adversely affected distributionally experience larger long-run Gini coefficients.

4.4 Regional redistributions

The trade liberalisation – even when combined with a nationally motivated redistribution - leads to increasing inequality in some regions. For this reason, here we explore the implication of a regionally motivated redistribution. This could arise, for example, where a national government chooses to maintain regional inequality at its pre-liberalisation level, or where tax systems are devolved to individual regions which decide to restore the pre-existing degree of equity. In both cases, tax rates are varied at the regional level.

Results are presented in Figure 6. Two issues are worth noting when comparing with Figure 4. First, the shape of the box and whiskers figure is very similar. Second, the variation of the regional effects is larger under the

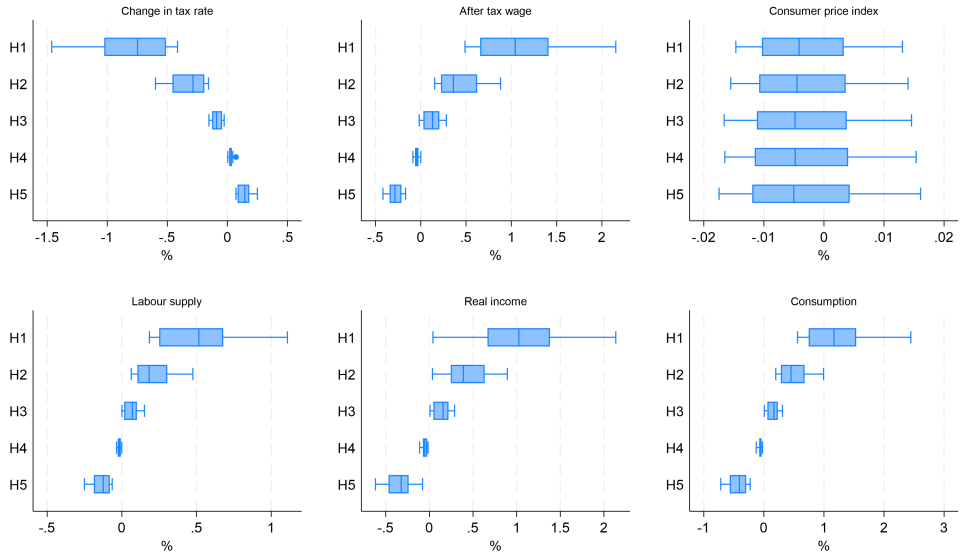

Figure 6: Box and Whiskers plot of regional dispersion in regional redistribution changes

regional policy. This second observation is driven by the fact that under a diverse regional structure, the required scale of policies to restore regional Gini coefficients varies significantly across regions. This is not surprising given the wide range of impacts of liberalisation on regional Gini coefficients apparent in Figure 3.

The regional redistribution has very similar aggregate effects to national redistribution. On aggregate, it reduces output and real household income by approximately 0.04% and 0.03% respectively. The regional redistribution policy has one key weakness. Although within-region Gini coefficients are re-instated to their pre-liberalisation values, the national Gini coefficient does not return to its pre-liberalisation value even if in this specific case

if falls to very nearly re-establish its initial level.[5] This is because trade liberalisation causes both within-region increases in net income dispersion and across-region increases in net income dispersion.

5 Conclusion

In this paper, we explore income distribution impacts of gains from trade at both national and regional levels using the UK as an example. Using an income, skills and spatially disaggregated CGE model of the UK economy we find that the gains from trade from a broad national trade liberalisation both boost the economy and increase inequality. The inequality increases vary significantly by region.

When the government uses income taxation to restore the pre-liberalisation Gini coefficient in order to redistribute the gains from trade, the gains from trade are partially eroded. This erosion is very small (0.04 percentage points) if compared with a 5 percentage point in output in our case. This slightly negative impact is due to the greater taxation imposed on higher income households which in turn reduce the supply of skilled labour, a result that is consistent with the theoretical work of Spector (2001). However, inequality does not improve in all regions and in fact increases for

[5]In the stylised example, the national Gini coefficient falls by 97% of the distance between the trade liberalisation Gini coefficient and the pre-liberalisation Gini coefficient. If the Gini coefficient did not fall by as much, between regions transfers may be implemented to ensure that the national Gini coefficient falls back to its pre-liberalisation baseline.

some.

When the government uses income taxation to redistribute gains from trade by restoring pre-liberalization regional Gini coefficient, results are similar to the national case but there is more regional variation. This is because some regions require more redistribution than others. Moreover, the resulting national Gini coefficient is above pre-liberalisation, though in our particular example the impact is negligible[6].

[6]In general, we do not know how different these outcomes will be. If major impact on national coefficient, regional transfers may be required to offset that.

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