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THE TRADE EFFECTS OF A NEW AGREEMENT ON SERVICES DOMESTIC REGULATION

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Abstract

In this paper, we project the impact of the implementation of a Joint Statement Initiative (JSI) on Services Domestic Regulation (SDR). We proceed in three steps. First, we include the WTO SDR Index, a binary score of SDR implementation in 23 sectors and 86 economies, in a gravity equation, estimated with the balance of payments services trade. We take into account domestic services trade to identify the impact of the importer-specific SDR Index by interacting the SDR Index with a border dummy, following an established methodology in the gravity literature. The estimation generates a significant impact of the SDR Index in a series of regressions pooled across all sectors, accounting for other determinants of services trade. Second, we map the estimates together with projected changes in the SDR Index into ad valorem equivalent trade cost changes under the implementation of the negotiated outcome on SDR. Estimated trade cost reductions are 10%, 14%, and 8.5% in lower-middle-income, upper-middle-income, and high-income countries respectively. In dollars, the estimated trade cost reduction of $127 Bn is similar to earlier OECD estimates of the trade cost reduction of the SDR of about $150 Bn. Third, the WTO Global Trade Model, a recursive dynamic computable general equilibrium (CGE) model, is employed to project the economic effects of the SDR outcome which are modelled as resource-saving reductions in iceberg trade costs. Simulations indicate that global income would increase by 0.3% in the long run (over 10 years), while global exports are projected to rise by 0.8%. The projected gains are largest in lower- and upper-middle-income countries while impacts on non-participants are projected to be marginally positive.

Keywords: Computable General Equilibrium models, gravity estimation; services trade

JEL codes: F13, F17

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1 Introduction

The importance of services in the global economy and trade should not be underestimated. Services accounted for 65.7% of GDP in the world's output in 2020 (World Bank national accounts). This share has steadily increased in most developing countries over the past decades whereas in developed countries, services are already the backbone of their economies for decades. The 2019 World Trade Report (WTO, 2019) highlights the rapid expansion of services relative to goods trade during most of the 21st Century, as well as its crucial roles in promoting inclusive growth and raising a nation's competitiveness. However, despite showing a declining trend, global barriers to services trade remain significantly higher than those for manufactured goods (Rubínová and Sebti, 2021). Moreover, barriers to services trade are multifaceted and take the form of formal restrictions on market access or establishment, as well as costs arising from regulatory differences, information asymmetries, and the absence of good governance.

Against the backdrop of the ever-growing importance of services trade and their relatively high trade costs, a group of 59 WTO Members launched a Joint Statement Initiative (JSI) on Services Domestic Regulation (SDR) at the 11th Ministerial Conference held in Buenos Aires in December 2017. This marks the beginning of a new negotiation on services-related disciplines since the General Agreement on Trade in Services (GATS) came into force in 1995. Subsequently, as the negotiations kept gaining momentum, it was joined by more Members such as Singapore, Thailand and the USA. Finally, after four years, the negotiation was successfully concluded in December 2021. The outcome encompasses 70 participants accounting for more than 90% of the global services trade. It marks the first WTO outcome on trade in services since the conclusion of the extended negotiations on basic telecommunications and financial services in 1998.

The outcome consists of a 'Reference Paper' which contains a set of disciplines on domestic regulation which aim to improve transparency and predictability of licensing and qualification requirements and procedures and technical standards faced by foreign suppliers. Moreover, it promotes communication between governments and foreign service suppliers with measures such as the establishment of enquiry points and the possibility to comment on new regulations before their entry into force. From a legal perspective, the disciplines included in the Reference Paper will be incorporated by individual participants as additional commitments in their schedules pursuant to Article XVIII of GATS. Crucially, the facilitative design of the Reference Paper also means that the Disciplines on domestic regulation do not cover, and thus should have no impact on, existing limitations relating to market access or national treatment under Articles XVI and XVII of GATS[1].

[1]For more information on the scope of the SDR, see 'Declaration on the Conclusion of Negotiations on Services Domestic Regulation' (WT/L/1129)

Despite the absence of measures that liberalise market access and establishment of services trade, regulatory uncertainty and the lack of transparency still represent a sizable portion of overall services trade costs. For instance, a joint policy brief by the WTO and OECD (2021) provides an initial economic assessment of the potential benefits of the SDR based on the OECD Services Trade Restrictiveness Index (STRI). The trade cost saving from the new agreement is estimated at around 150 billion USD per year. Most of the savings will be concentrated in services trade between participants in the outcome, but trade costs will also be reduced for non-participants due to the non-discriminatory nature of the domestic regulation disciplines. In this paper, we supplement the aforementioned policy brief by providing a more comprehensive analysis of the potential trade benefits as well as the wider economic impacts of the Reference Paper based on detailed information from individual provisions contained therein.

To achieve this, we proceed in three steps. First, we estimate a structural gravity model on a new SDR index created by the WTO Secretariat (Baiker et al., 2021). The index assigns scores for a number of service sectors across different economies based on the extent to which SDR-related disciplines have already been implemented prior to the conclusion of the negotiations on the Reference Paper. Unlike other measurements of services trade barriers such as the STRI, the SDR index possesses the unique advantage that it is narrowly defined and tailored to cover only the disciplines present in the Reference Paper. Given that the SDR index is also an economy- and sector-specific variable, we additionally include intra-national services trade to exploit a recent empirical development in the structural gravity literature by Heid et al. (2021). More specifically, through interaction with a border dummy, we can identify economy-specific or non-discriminatory variables even with the inclusion of importer and exporter fixed effects which are required to control for multilateral resistance terms (Anderson and van Wincoop, 2003). While the SDR disciplines are meant for non-discriminatory application and should therefore benefit domestic firms, most established domestic firms are already well-adapted to the navigation of their own economy's regulatory landscape. Indeed, our estimation indicates that foreign firms expand sales more than domestic firms. Overall, we found that SDR disciplines are among the key drivers of bilateral services trade.

Second, the coefficients on the impact of the SDR disciplines on trade acquired from the gravity model are converted into ad-valorem equivalents (AVE) reductions in services trade costs based on standard formula (for example in Bekkers and Rojas-Romagosa (2019)). Our calculations indicate an average AVE cost reduction of 9% across various service sectors. At the economy level, we find an average AVE cost reduction of 9.4%, 13.4%, and 8.2% for lower-middle, upper-middle and high-income countries respectively[2]. Combined with data on the size of services trade for 2017, the last year for which reported data are available in the

[2]Currently, no WTO Member from the low-income country group is a participant of the SDR outcome

employed GTAP Data Base, these AVE percentage reductions correspond to an estimated trade cost saving of $127 billion which is largely in line with the OECD estimate of $150 billion.

In the third step, the calculated AVE percentage reductions in trade costs are fed into a computable general equilibrium (CGE) model as trade shocks. As a highly influential tool among policy-makers and economists for analysing trade policies, CGE modelling allows us to simulate the implementation of the SDR disciplines and to acquire *ex-ante* projections of the Reference Paper's wider economic impacts on income, investment, price movements, and trade flows. The particular model used in this paper is the WTO Global Trade Model developed by Aguiar et al. (2019) which is itself a modelling extension of the static, multi-region, and multi-sector CGE framework pioneered by Hertel (1996) at the Center for Global Trade Analysis (GTAP). In comparison with the standard GTAP model (Corong et al., 2017), the WTO Global Trade Model introduces various extensions such as monopolistic competition and upward-sloping factor supply curves. But most importantly, its recursive dynamic feature further allows us to track the aggregate impacts from the implementation of the SDR disciplines over time. In this case, by assuming an implementation period of 10 years, our simulations suggest that in the year 2032, global trade, real income, and real investment are projected to increase by 0.84%, 0.30%, and 0.16% respectively against the baseline projection. Moreover, our economy-level analysis points to the distributional effects of the implementation of the SDR disciplines as there are winners and losers both between and within economies. Finally, we have developed various hypothetical scenarios to highlight the inclusiveness and full potential of SDR implementation. We find that further gains can be realised by widening the participation of the SDR outcome to include more developing countries.

We make three contributions to the literature on services trade restrictions. Firstly, we are the first to estimate the impact of SDR provisions on trade employing a methodology recently introduced in the gravity literature. Secondly, we analyse the potential trade and welfare effects of the disciplines on SDR, whereas existing work only provides estimates of trade cost reductions associated with their implementation. Thirdly, we analyse the impact of the SDR-implementation on non-participating economies showing that the impact on these economies is marginal but positive. Furthermore, we show that these regions are expected to benefit from participating in the SDR outcome by implementing the disciplines.

The paper is organised as follows. In Section 2 we describe the relation with the recent literature. In Section 3 we present the gravity estimation, discussing in turn the empirical strategy, the employed data, and the estimation results. Section 4 presents the estimated reductions in AVE trade costs and Section 5 outlines the counterfactual experiments, starting with a brief description of the model and the way the shocks are implemented in the model

after which the simulation results are presented. Section 6 concludes.

2 Linkages with recent literature

Given the overall structure of this paper, we review three broad strands of literature: (1) structural gravity estimation, (2) estimation of AVE services trade barriers, (3) and CGE simulation. Ever since the breakthrough in theoretical development from Eaton and Kortum (2002) and Anderson and van Wincoop (2003), the structural gravity model has become a key cornerstone of modern trade policy analysis. Among the vast gravity-related literature published in the subsequent two decades, our paper follows a recent academic trend of incorporating intra-national, in addition to international/bilateral trade flow, in structural gravity estimation. Their inclusion confers several advantages such as greater consistency when estimating bilateral trade policies (Dai et al., 2014; Yotov, 2012) and a potential solution to the 'distance puzzle' (Bergstrand et al., 2015). The inclusion of intra-national services trade flows further allows us to apply a novel estimation technique developed by Heid et al. (2021) which, through the interaction with a border dummy, enables the estimation of economy-specific variables (i.e. the SDR Index) despite the presence of importer and exporter fixed effect (See Section 3.1). From this perspective, our paper also adds to the expanding list of studies which incorporates intra-national data to estimate economy-specific policy determinants of trade (Beverelli et al., 2018; Benz and Jaax, 2020; Esteve-Pérez et al., 2020; Felbermayr and Yotov, 2021).

Barriers to services trade are solely comprised of non-tariff measures (NTMs). When measuring the magnitude of these restrictions, most studies have adopted the concept of AVE which is measured based on a counterfactual scenario where these NTMs are entirely removed and replaced with a certain level of tariffs/iceberg trade costs with equivalent prohibitive effects on trade. This allows for comparison between different types of barriers to services trade as well as a comparison of the barriers in merchandise trade[3]. With the growing importance of services trade in the global economy, establishing accurate AVE estimates has become an important priority in the services trade literature. As noted in a comprehensive review by Francois and Hoekman (2010), early attempts largely relied on gravity models to estimate an 'ideal' level of service trade in the absence of restriction, subsequently backing out the AVE of barriers based on observed trade flows. A more recent study from Fontagné et al. (2016) also involves gravity estimation, but the calculation of AVEs is carried out by comparing an economy's trade flows against a benchmark economy with the greatest difference between predicted and actual services trade. Alternatively, Miroudot et al. (2013) follow

[3]However, with successive reductions in tariff over the past decades, there is also a growing interest in measuring the AVE of NTMs in merchandise trade. See, for example, Kee et al. (2009) and Cadot and Gourdon (2016)

Novy (2013) and calculate AVEs based on ratios of international and intra-national services trade. The methods employed in these studies possess several advantages, most notably the limited requirement for data, as well as their top-down approach which is better placed at capturing the full range of service barriers. However, the holistic approaches above are less suitable for our study as it is difficult to attribute the extent of AVE cost reduction resulting from specific changes in regulations associated with the implementation of the SDR.

On the other hand, there is another estimation strategy which calculates AVE levels and reductions based on detailed indices such as the OECD's STRI that are constructed to capture regulatory environments across both economies and sectors. Two main approaches can be distinguished within this set of studies. One group employs a more micro-founded technique of regressing observed price-cost margins on various sector-specific controls. However, their estimations must be carried out sector by sector which can be demanding with regard to sector-level data. As a result, most papers tend to focus on just one sector while comprehensive multi-sector and multi-country studies are few and far between. Some examples include Fontagné and Mitaritonna (2013)'s computation of AVEs for the distribution and telecommunication sector within 11 emerging economies, or the large-scale study from Jafari and Tarr (2017) which covers 11 service sectors in 103 economies.

Our paper belongs to the latter group which continues to use a gravity model, but this time incorporating the relevant policy index as one of the determinants of services trade. After running the gravity estimation, the acquired coefficient for the policy index is subsequently transformed into AVEs. In comparison, the key advantage of this approach lies in the relative ease of calculating AVE cost reductions from liberalisation as it only requires obtaining the changes in the policy index and the elasticity of substitution (See Section 4). Studies that adopted this particular gravity approach for calculating the AVEs of service barriers include Walsh (2006) and van der Marel and Shepherd (2020). Here, we would like to acknowledge a recent paper by Benz and Jaax (2020) which calculates AVEs based on the OECD's STRI. These AVEs are in fact the basis for the estimation of trade cost savings in the aforementioned WTO and OECD (2021) joint policy brief. Despite the many differences in details, this paper broadly follows the same approaches in both structural gravity modelling and the computation of AVEs.

The introduction of CGE modelling via the WTO Global Trade Model in this study serves to bring the calculated AVE cost reduction from a partial equilibrium gravity model approach into a general equilibrium approach to project the wider economic impacts of the newly concluded SDR Reference Paper. While there are different approaches to CGE modelling[4], the

[4]For example, the Modelling International Relationships in Applied General Equilibrium (MIRAGE) model developed by Bchir et al. (2002), or the recent development of the *ex-ante* structural gravity analysis such as the study of Brexit from Felbermayr et al. (2022)

standard GTAP model remains one of the more popular tools in trade policy analysis, and it has also been widely applied in other disciplines such as agriculture, migration, and climate change. Following extensive modelling developments over the years[5], there has since been an ample body of literature on the *ex-ante* projection of services trade liberalisation. Studies that solely focused on services trade liberalisation include post-Uruguay liberalisation studies by Dee and Hanslow (2000) and Lejour et al. (2008)'s modelling on the EU Services Directive. However, most other studies are usually accompanied by agricultural and manufactural liberalisation to simulate multilateral and plurilateral agreements. A few selected examples in this regard include Francois et al. (2005), Francois et al. (2013), Ciuriak and Xiao (2014)'s simulations of the Doha Round negotiation, Transatlantic Trade and Investment Partnership (TTIP), and Trans-Pacific Partnership (TPP) respectively. Finally, with regard to the WTO Global Trade Model used in this paper, it has also been applied in the modelling of baseline developments (Bekkers et al., 2020) as well as in long-run projection studies (Bekkers and Koopman, 2022).

3 Gravity Estimation

3.1 Empirical Strategy

Since its first application in the mid-20th century[6], the gravity model has become the 'workhorse tool' of trade policy analyses. Derived from Newton's Law of Universal Gravitation, the model is intuitive and even in its simplest form, it is capable of returning consistent results with surprisingly high goodness-of-fit. Over the past decades, the model has benefited from a thorough theoretical underpinning, most notably by Eaton and Kortum (2002) and Anderson and van Wincoop (2003), thus giving rise to the structural gravity model.

Aside from establishing a theoretical framework, an important feedback from theoretical developments to empirical application of the gravity model is the need to control for inward and outward multilateral resistance terms. First coined by Anderson and van Wincoop (2003), they highlight the need that, on top of bilateral trade barriers, one also has to take both importer and exporter's relative trade barriers with all third economies into consideration. However, these theoretical terms are not directly observable and failure to include them will lead to estimation bias.

A main issue in the estimation strategy arises from the fact that the key interest variable of this study, the SDR index, is an economy-specific variable under the gravity framework. So, unlike bilateral variables such as distance, there is only one value per importer which does not vary by trading partner. This is a specific design choice of the SDR Index to

[5] A detailed discussion of modelling approaches for services trade is provided in Section 5

[6] (Isard, 1954; Tinbergen, 1962)

reflect the Reference Paper's emphasis on services trade facilitation – the various disciplines on transparency and ensuring legal certainty are non-discriminatory in principle and should benefit both participants in the SDR outcome and non-participants alike. However, this poses an identification challenge in our estimation since including importer and exporter fixed effects would essentially absorb all economy-specific variables. And importer and exporter fixed effects are typically included to capture the impacts of multilateral resistance which capture importer's and exporter's relative trade barriers with all third economies.

Various approaches have been proposed in the literature to control for multilateral resistance terms in gravity estimation. These include the use of a 'remoteness index' as proposed by Wei (1996); including Taylor approximations of the multilateral resistance terms (Baier and Bergstrand (2009)); or the elimination of the multilateral resistance terms by taking ratios of international and intra-national trade costs (Novy, 2013) and regressing the resulting measure of inferred trade costs on trade policy measures. However, most studies control for these terms by including exporter and importer fixed effects (Feenstra, 2004), or exporter-time and importer-time fixed effects in the case of panel data (Olivero and Yotov, 2012). An advantage of this approach is that the inclusion of fixed effects absorbs both observable and non-observable economy-specific determinants of trade, thus further reducing a potential omitted variable bias which is particularly useful in a cross-sectional setting. However, the inclusion of importer and exporter fixed effects precludes including economy-specific variables in the gravity equation.

Instead of using one of the above methods to handle multilateral resistance terms, we overcome this estimation challenge by adopting a simple yet theory-consistent method developed by Heid et al. (2021) to identify the impact of non-discriminatory variables on international trade in the presence of fixed effects. This involves the inclusion of both international and intra-national trade flows identifying the impact of an economy-specific variable like the SDR Index based on the differential impact of the economy-specific variable on international relative to intra-national trade. Technically, this is done by interacting the economy-specific variable with a border dummy. Such a dummy takes the value of one for international and zero for intra-national trade flows. We can identify the impact of economy-specific variables by interacting them with the constructed dummy, which introduces variation within importers[7] and consequently it will no longer be absorbed by fixed effects, thus making identification possible.

The validity of the border dummy interaction approach is further discussed in Beverelli et al. (2018) which addresses potential concerns over potential endogeneity and reverse causality. Citing Nizalova and Murtazashvili (2016), they argued that the border dummy can

[7]Under a gravity setting, the interacted economy-specific variable will take the value of zero for all intra-national economy-pair (i.e. whenever importer = exporter)

be considered as a treatment variable and in such context, the estimates of the interaction term with the interest variable (the SDR Index) should be consistent as long as the interest variable is exogenous to the border dummy. This is most likely the case since the border dummy is simply an indicator of whether a particular economy-pair represents intra-national or international trade.

About 20% of our service trade data consists of zero values. To avoid losing these observations when estimating in logs, we follow Santos Silva and Tenreyro (2006) and adopt the Poisson pseudo maximum likelihood (PPML) estimator. This also mitigates the potential bias arising from heteroskedasticity in the data. Since the SDR Index is available for one year only, we necessarily need to restrict the gravity estimation to a cross-sectional analysis. We calculate the average trade values between 2016 and 2018 to retain as much data as possible while at the same time limiting data volatility.

We pool the services data from different sectors and conduct estimation at the economy-level. This differs from most papers reviewed above which tend to split the dataset and adopt a sector-by-sector estimation. Indeed, sector-specific coefficients are usually more intuitive and better at reflecting the characteristics of each individual sector. In addition, they also introduce more variation when computing AVEs. However, as we will explain in detail in the next section, our services trade data at the sector level are compiled from four different sources and we rely on various approximations to construct sector concordances. Therefore, due to data limitations, we argue that coefficients acquired from sector-by-sector estimation would not be robust or comparable and we conduct a pooled estimation instead.

Altogether, this leads to the following estimating equation with k, i, j indicating sector, importer, and exporter respectively:

$$X_{ijk} = \exp(\beta_1 + \beta_2 Border_{ij} + \beta_3 SDR_{ik} \times Border_{ij} + \gamma \mathbf{Z}_{ij} + \eta_{ik} + \mu_{jk}) \times \epsilon_{ijk} \qquad (1)$$

X_{ijk} corresponds with the value of services imports from economy j to economy i in sector k. As discussed above, the SDR is identified by interacting with the border dummy which equals 1 whenever $i \neq j$; $\mathbf{Z}$ is a vector of bilateral control variables; finally, η_{ik} and μ_{jk} are importer-sector and exporter-sector fixed effects.

3.2 Data Description

In this section, we present an overview of the different data sources and in turn introduce the dependent, interest and control variables. Particular emphasis is given to the construction of international and intra-national services trade and the various necessary data adjustments.

a) Dependent Variable: Services Trade

International Services Trade The bulk of our bilateral-sector services trade data comes from the OECD-WTO Balanced Trade in Services (BaTIS) database (Fortanier et al., 2017). Recently, it was updated by Liberatore and Wettstein (2021) to include trade data up to 2019 covering 12 service sectors for more than 200 economies. Note that the BaTIS database provides a full matrix of trade data. This means that missing entries were first filled in based on extrapolated values from a gravity model and subsequently underwent various balancing procedures to tackle asymmetries and inconsistencies in the data series. To avoid employing extrapolated data that are themselves based on a separate gravity estimation, we instead use the 'untreated' trade data which are reported separately in the BaTIS database. These are reported services trade statistics compiled from various national sources and other databases such as the OECD and Eurostat.

The sector classification in the BaTIS database is based on the Extended Balance of Payments Services Classification (EBOPS) 2010. However, the GTAP database used for CGE simulation is based on the International Standard Industrial Classification (ISIC) Revision 4. Although a direct concordance between the two classifications is not available, we adopt approximations similar to those used in the construction of the Trade in Services data by Mode of Supply (TiSMoS) database (Wettstein et al., 2019) to acquire information for four out of the six sectors in the SDR Index[8].

Data for the remaining two service sectors are constructed with more disaggregated data. More specifically, the EBOPS service sector 'other business services' (SJ) encompasses both professional (ISIC - M) and wholesale/trade (ISIC - G) services. To split the sector, we rely on the EBOPS sub-sector 'trade-related services' (SJ34) which is approximated as the wholesale/trade (ISIC - G) services. As a result, data on professional services are acquired by subtracting sector SJ from SJ34. For a more illustrated view, refer to Table A1 in the appendix. Note that disaggregated information on EBOPS SJ34 is not available from the BaTIS database. Therefore, a second data source, the WTO-UNCTAD-ITC trade in services dataset from the WTO Stat portal, is used to construct both professional and wholesale & trade services. They are subsequently appended to the data for the other four service sectors coming from the BaTIS database.

After the initial collection of data, we fully exploit both inward and outward services trade data[9] at our disposal with the mirroring technique. We take export data from the source (exporter) economy and transform them into import values from the perspective of the

[8]The four sectors are (1) transport (ISIC - H); (2) communication (ISIC - J); (3) finance (ISIC - K64); and (4) Insurance (ISIC - K65)

[9]Typically, each economy's trade statistic contains both its value of imports from different trading partners as well as the value of exports to different trading partners

trading partners (importers). This procedure generates many overlapping observations in instances where both mirrored values and inward data are available, and the large discrepancies between them are a well-known issue in the trade literature. Among the various methods of reconciliation, we adopt a simple approach by giving preference to reported import data and only using mirrored values for missing entries. In general, we believe that importers should have greater incentives to accurately measure inward services trade for various tax and regulatory purposes. Note that mirrored values are only adopted when there are no inward data for the entire 3-year period within a given economy-pair. This additional constraint is imposed to prevent mixing inward and mirrored values within the time series. In the end, in terms of international services trade, we are able to collect information for over 200 economies.

Domestic Services Trade Following the estimation strategies outlined in the last section, we now turn to the construction of the intra-national component of the dependent variable (i.e. domestic services trade). We adopt the standard procedure whereby intra-national trade is calculated by subtracting total exports from gross output:

$$\text{Intra-National Service Trade}_{ik} = \text{Gross Output}_{ik} - \text{Total Export}_{ik}$$

Data on sector gross output (at basic prices) are collected from two sources. First, note that (1) transport (ISIC - H); (2) communication (ISIC - J); (3) profession (ISIC - M); and (4) wholesale & trade (ISIC - G) sectors are at the one-digit level of the ISIC classification. For these four sectors, output data are gathered from the United Nations Statistics Division (UNSD) which covers 90 economies. To ensure consistency at the sector level, we only consider UNSD's output data under the 4^{th} Revision of ISIC and not the 3^{rd}. Moreover, some economies are still reporting output data under the 1993 System of National Account (SNA) conceptual framework while most other economies have switched to the 2008 version. We give preference to the 2008 framework when data under both versions are available. However, we also allow reporting under the 1993 framework to maximise economy coverage. The other two sectors, finance (ISIC - K64) and insurance (ISIC - K65), are located at the ISIC two-digit level. Disaggregated information at this level is not available from the UNSD and the output data are instead collected from the OECD national account dataset which has a smaller coverage of 37 economies.

Regarding total exports, the BaTIS and WTO Stat portal both report economies' total sector exports to the World. For economies or sectors not covered in the two databases, their total sector export is constructed by aggregating the bilateral trade data. The approach is less ideal as it is prone to underestimation due to missing or confidential values, especially for

economies whose data are primarily or solely based on mirrored values. They are nevertheless included to maximise coverage.

Mode of Supply in Services Trade Services trade as defined under the GATS consists of four different modes of supply: (1) cross-border trade, (2) consumption abroad, (3) commercial presence, and (4) presence of natural persons. As discussed above, our dependent variable is based on the EBOPS 2010 classification, and services trade under the balance-of-payments (BOP) framework has a narrower set of definitions than those from the WTO – they account for modes 1, 2, and 4 only.

In contrast, mode 3 services trade is typically associated with sales of multinational affiliates. This is not a minor omission: in the experimental TiSMoS database, mode 3 accounts for over 60% of world services trade and is the dominant mode in all sectors except for Transport. Although it is possible to include mode 3 services trade by running a separate gravity estimation with foreign affiliate statistics (FATS) as the dependent variable, we have not done so since our CGE model employed in the counterfactual analysis does not cover mode 3. Including mode 3 services trade would necessarily involve modelling extension to incorporate FDI which is beyond the scope of this paper.

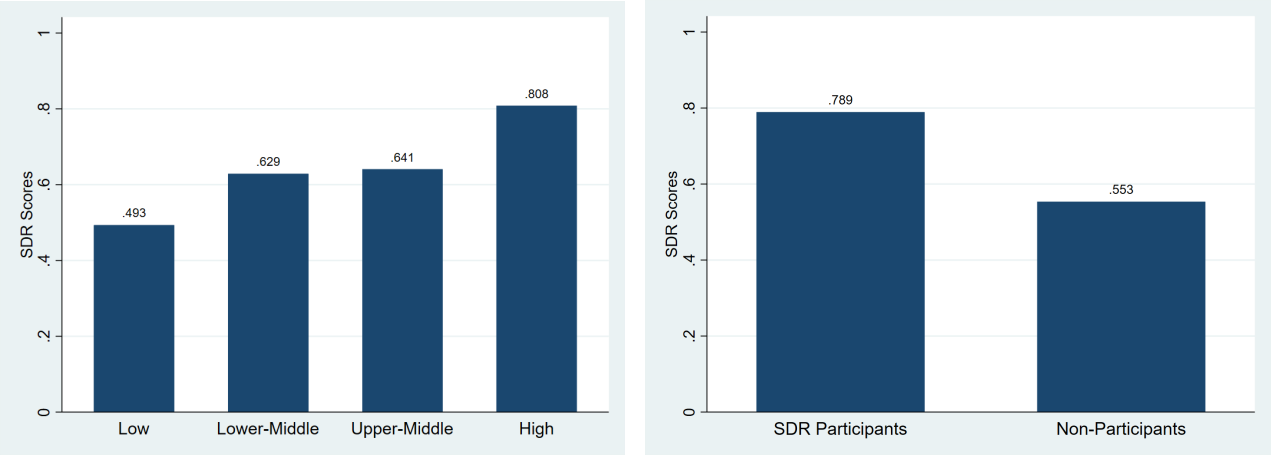
b) Variable of Interest: SDR Index

The WTO SDR Index was developed by Baiker et al. (2021) to facilitate ongoing negotiations by revealing the extent to which SDR-related disciplines have already been implemented in various Members' national regulatory frameworks. The index is narrowly constructed to cover only 14 disciplines that feature predominantly in the SDR negotiation, relating to measures such as single window, licensing procedures, and prior notice. Primary sources of the SDR Index are two different STRI, one developed by the OECD and the other one jointly by the World Bank and the WTO. These are complemented by a few other indices and surveys as well as various national sources. The index assigns a binary score of 0 (no implementation) or 1 (implementation) for 23 service subsectors and three modes of supply in 86 WTO Members, of which 55 Members are part of the negotiated outcome on domestic regulation [10]. For our purposes, we adopt the overall scores across three modes in the six aggregated service sectors which are acquired through simple averaging.

Figure 1 displays some aggregate statistics of the SDR Index. The average scores range from 0.49 among low-income countries and 0.81 among high-income countries as defined by the World Bank. This is expected as more developed nations tend to have more capacity to implement policies that facilitate services trade. In addition, while there are 22 middle-income developing countries among the SDR participants, the majority of the 70 participating Mem-

[10]The SDR Index does not cover all 70 participants in the SDR outcome

Figure 1: Average SDR Index Scores by (a) Income Level, and (b) Participants



(a) (b)

bers are developed nations. As a result, the average SDR scores of the SDR participants are significantly higher at 0.79 compared to 0.55 among non-participants. A more detailed discussion of stylised facts on the SDR Index can be found in Baiker et al. (2021). This discussion shows for example that economies with higher SDR scores engage more actively in services trade and participate more actively in global value chains (GVCs).

c) Control Variables

The control variables are comprised of a standard set of bilateral indicators sourced from the CEPII database to account for various geographic, cultural, and historical relationships. More specifically, bilateral distance (taken in logs), religious proximity, and three other dummy variables taking the value of 1 if an economy-pair (1) has been in a colonial relationship, (2) adopts a common legal origin (post-transition), or (3) has a common language as measured on an ethnographic basis. Finally, we have constructed an FTA dummy based on the Design of Trade Agreements (DESTA) Database[11] as well as a European Economic Area (EEA) dummy[12] to control for the uniquely deep integration within the European single market.

d) Year, Economy, and Sector Coverage

Table 1 displays a summary of all the variables introduced above as well as other relevant information such as their year and economy coverage. Since our interest variable, the SDR Index does not have a time dimension, we resort to a cross-sectional analysis in this study.

[11]The FTA dummy in the CEPII database is only updated to 2015, meanwhile the DESTA database from Dür et al. (2014) is updated to 2019 and covers all treaties that were notified to the WTO

[12]The dummy variable takes the value of 1 when both the host and source economy are EEA Members

Table 1: Summary of Variables (Gravity Estimation)

Variables	Type	Country Coverage	Format	Year
Services Trade Data	Dependent	47*	-	2016 -2018
Services Domestic Regulation Index	Interest	86	Country-Specific	2021
Border Dummy	Control	-	Bilateral Dummy	-
Log of Distance (CEPII)	Control	224	Bilateral	time-invariant
Colonial Relationship (CEPII)	Control	224	Bilateral Dummy	time-invariant
Common Language (CEPII)	Control	224	Bilateral Dummy	time-invariant
Religious Proximity Index (CEPII)	Control	224	Bilateral	time-invariant
Common Legal Origin	Control	224	Bilateral Dummy	time-invariant
Free Trade Agreement	Control	Full	Bilateral Dummy	2016-2018
European Economic Area	Control	Full	Bilateral Dummy	time-invariant

*After accounting for the availability of domestic services trade

Instead of estimating on a single year, we take averages from 2016 to 2018, the three most recent years for which comprehensive services trade data are available in the BaTIS database. This allows us to retain as much information as possible while also mitigating volatility and potential measurement errors in the data. Note that this also applies to control variables with time dimensions, i.e. the Free Trade Agreement dummy.

Regarding economy coverage, the CEPII database has near-universal coverage. However, as shown in the table, the economy coverage of our study is limited by the availability of the dependent variable. Although we managed to acquire international services trade data for more than 200 economies, our methodology requires both international and domestic services trade. As a result, the economy coverage of the dependent variable is limited to just 47 reporting economies (importers). While this is far from universal coverage, the remaining 47 economies, of which 43 are participants, still account for almost two-thirds of the 70 participants in the SDR outcome. Note that AVEs can also be calculated for economies not in the estimation by combining the estimated set of SDR coefficients with changes in SDR scores (see Section 4).

The six aggregate service sectors covered in this study are displayed in Appendix Table A1. Note that due to the limitation of the SDR Index, we are unable to cover all 18 sectors at the one-digit ISIC level such as education (ISIC - P) and construction (ISIC - F). Nevertheless, the omitted sectors are relatively small when it comes to their volumes of services trade. Our final gravity estimating equation is specified as follows:

$$
\begin{aligned}
X_{ijk} = \exp(&\beta_1 + \beta_2 Border_{ij} + \beta_3 SDR_{ik} \times Border_{ij} + \beta_4 \ln(DIST)_{ij} \\
&+ \beta_5 Colony_{ij} + \beta_6 Religion_{ij} + \beta_7 ComLang_{ij} + \beta_8 ComLegal_{ij} \\
&+ \beta_9 FTA_{ij} + \beta_{10} EEA_{ij} + \eta_{ik} + \mu_{jk}) \times \epsilon_{ijk}
\end{aligned} \tag{2}
$$

3.3 Estimation Results

The main results of our pooled gravity estimation are presented in Table 2. We found that the coefficient of the SDR Index is positive and statistically significant at 1%, meaning that economies with facilitation policies in place, hence higher SDR scores, import more services. The border dummy and log of distance are both negative and significant at the 1% level. Other variables from the CEPII database as well as the EEA dummy are also mostly as expected. However, the FTA dummy is negative and significant which was also observed in Benz and Jaax (2020). We concur with their explanation that past FTAs, especially those signed in the last century, tend only to liberalise goods trade without any service-related provisions.

4 AVE Cost Reductions

4.1 Formula

We adopt the standard approach provided for example in Bekkers and Rojas-Romagosa (2019) to calculate the AVE cost reduction of services trade. The formula follows from the structural gravity framework consistent with the model used in the counterfactual analysis:

$$
\text{AVE}_{ik}^{\Delta\text{SDR}} = \exp\left[\frac{(\text{SDR}_{ik}^{new} - \text{SDR}_{ik}^{old}) * \beta_{\text{SDR}}}{(1-\sigma)}\right] - 1
$$

The calculation of the AVE requires three components: (1) changes in the SDR Index score following the implementation of the Reference Paper, $\text{SDR}_{ik}^{new} - \text{SDR}_{ik}^{old}$, (2) the coefficient of the SDR Index from the equation, β_{SDR}, and (3) the elasticity of substitution, σ.

First, the narrow design of the SDR Index means that it is straightforward to derive the changes in scores from the implementation of the SDR disciplines. They are simply one (which represents full implementation) minus the current score. The implications can be inferred from Figure 1 which suggests lower-income countries with lower scores on average would see correspondingly higher reductions of NTM barriers in service sectors. However,

Table 2: Pooled Gravity Estimation

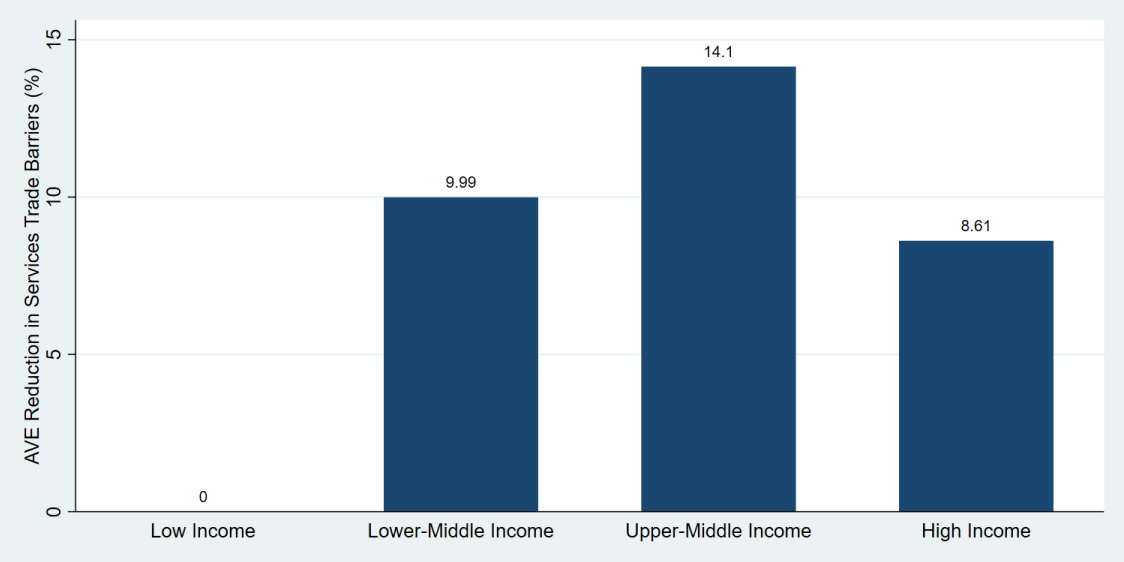
VARIABLES	(1)
Services Domestic Regulation Index	1.481***
	(0.440)
Border Dummy	-6.358***
	(0.429)
Log of Distance	-0.531***
	(0.0554)
Colonial Relationship	0.169
	(0.144)
Common Language	1.207***
	(0.106)
Religious Proximity Index	0.242*
	(0.141)
Common Legal Origin	-0.0546
	(0.0701)
Free Trade Agreement	-0.777***
	(0.103)
European Economic Area	0.338***
	(0.117)
Observations	14,692
Host-sector F.E.	Yes
Source-sector F.E.	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

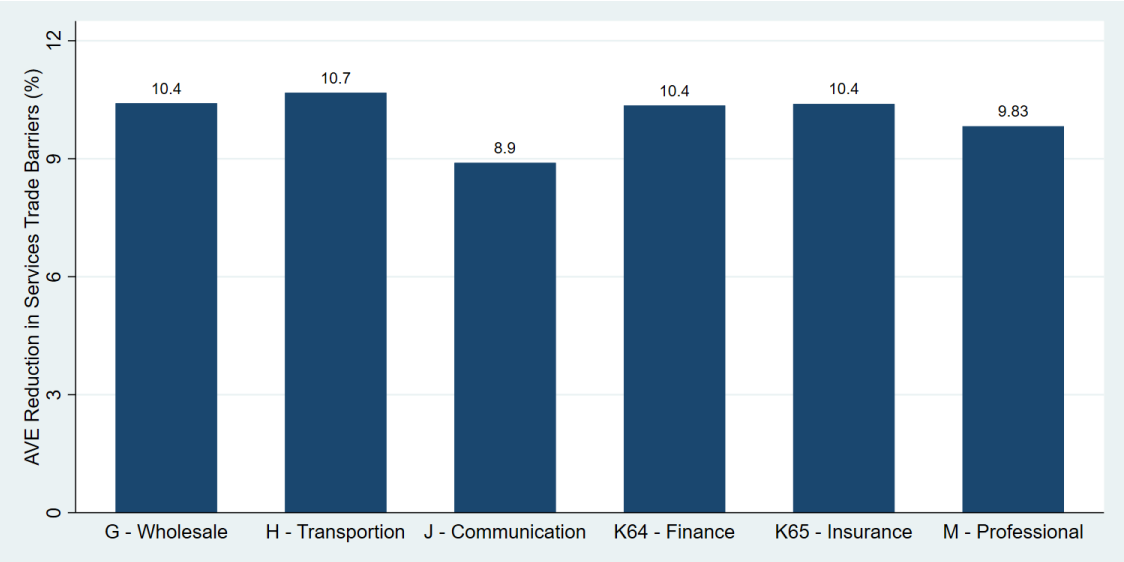
given that the current participants of the SDR outcome are the majority developed Members, the full potential of the agreement will not be achieved until wider economy coverage has been achieved. As for the SDR Index coefficients β_{SDR}, it is set at 1.481 as shown in Table 2.

Finally, regarding the substitution elasticity, most studies either structurally estimate their own elasticity or adopt them from the literature. For example, Benz and Jaax (2020) calculate AVEs based on simple averages of the values for the substitution elasticity reported in the relevant literature. Their elasticities range from 2.77 in the insurance sector to 3.67 in communication. Given that our calculated AVE cost reductions are used as an input for shocks in subsequent CGE simulations, a common practice is to adopt the same elasticity throughout for consistency. As a result, we adopt the value from the GTAP database with a uniform value of $\sigma = 3.8$ for all service sectors.

Figure 2: AVE Cost Reductions by (a) Income Group and (b) Service Sector



(a)



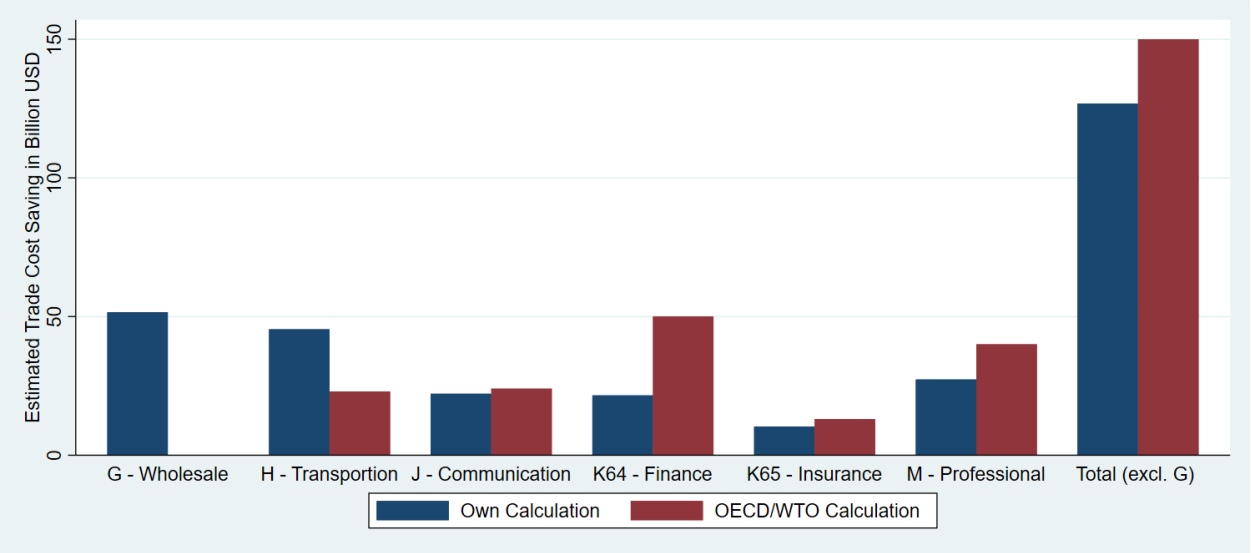
(b)

*The above statistics are acquired through simple averages and they represent the AVE cost reduction of SDR participants only

4.2 Summary of Results

Figure 2a displays the average AVE cost reductions by income group as defined by the World Bank as a result of the implementation of the SDR disciplines. Immediately, we observe that the value for the low-income country group is zero. This reflects the more limited participation from developing countries in the current negotiation, especially among least developed countries (LDCs). In the other income groups, the AVE cost reductions range from 8.6% among high-income countries to 14.1% among upper-middle-income countries.

Figure 3: A Comparison of Trade Cost Savings by Sector (Billion USD)



Next, Figure 2b displays the average AVE cost reductions by service sectors. Note that there isn't much variation across the sectors and the AVE cost reductions are hovering around 10%. This is because, as shown in the formula that calculates AVEs in Section 4.1, our only source of sector variation (with a subscript k) comes from the SDR Index. Since we rely on pooled estimation and adopt a uniform substitution elasticity as in the GTAP database, both the coefficient of the SDR Index and the substitution elasticity do not vary across sectors.

As an initial gauge of its size, we compute an estimate of the potential global trade cost savings from the implementation of the SDR disciplines by multiplying the AVE cost reductions with the volume of services trade flows. Unlike most FTAs whereby concessions are only granted among participants, the facilitative nature of the SDR disciplines is non-discriminatory by design and therefore benefits potential service suppliers from both participating and non-participating Members. Consequently, large potential cost savings can be realised with even a modest reduction in services trade barriers.

Figure 3 outlines our calculation of the total savings in billion USD by sector. As a comparison, we also include the estimated trade cost reduction reported in the joint WTO and OECD (2021) policy brief which is based on changes in the OECD STRI and the estimates from Benz and Jaax (2020). Beginning with the total world trade cost savings shown in the rightmost column, after excluding the wholesale & trade sector[13], the total savings from our calculation stands at $127 billion which are similar to those acquired in the policy brief mentioned above at $150 billion. The similarity in total savings is reassuring: although the calculation of AVE cost reductions follows the same formula as in the joint policy brief, our

[13]Benz and Jaax (2020) provides estimations for five services sectors which do not include wholesale & trade

gravity estimation and the selection of substitution elasticity (see Section 4) are entirely different. However, it is therefore expected that there will be large differences at the sector level. For example, our estimate of the trade cost savings in the transportation sector is $45 billion whereas the figure in the policy brief is much lower at $23 billion.

5 Counterfactual Policy Experiments

In this section, we report the results of simulations of counterfactual experiments with recursive dynamic CGE modelling. We discuss in turn the employed model, the implementation of policy shocks using AVE cost reductions, and the simulation results.

5.1 A Recursive Dynamic CGE Model

Recursive dynamic CGE models are widely used by researchers to make *ex-ante* projections of the impact of counterfactual changes in trade policies. It accomplishes these by comparing a baseline scenario with a policy scenario that incorporates relevant policy shocks such as tariff or NTM reductions. Most CGE models are grounded in microeconomic theories and contain detailed input-output tables and trade databases across regions and sectors. As a result, aside from inferring macro impacts such as GDP and welfare, the main advantage of CGE models lies in their ability to capture complex linkages in a general equilibrium setting. In this subsection, we introduce our model's main features, set-up, and the aggregation of economies and sectors chosen.

a) Model

In this study, our simulations are carried out using the WTO Global Trade Model and we briefly introduce its main features below. For a detailed overview, we refer to the technical documentation in Aguiar et al. (2019).

Our model is primarily an extension of the standard GTAP model (Corong et al., 2017) and retains many of its core features. Specifically, a regional household allocates its income to private consumption, government consumption, and savings according to a Cobb-Douglas utility function. The demand for private goods across different commodities is further governed by non-homothetic preferences. In terms of production, output is created by combining a set of intermediate good bundles and value-added (labour, capital, natural resources, and land) under nested constant elasticity of substitution (CES) functions.[14] Savings are collected by a global bank and their allocation to investment in different regions depends on the

[14]Note that by default, the relationship between the aggregate intermediate and value-added bundle at the top layer and between intermediates follows a Leontief production function, i.e. there is no substitutability between the two bundles.

choice of model closure which we will discuss in more detail below. Finally, international trade takes place whenever there is final goods demand from other regions or when foreign intermediate goods are used in production. Imports are governed by Armington CES specifications with the top layer distinguishing the substitution relationship between domestic and imported goods while the second layer distinguishes between imported goods of different origins.

The standard GTAP is a static comparative model, meaning that it computes and then compares equilibrium properties before and after policy shocks at a single point in time. In this regard, the main extension of the WTO Global Trade Model is the introduction of recursive dynamics which traces the growth path of economies. Most importantly, it allows the implementation of policy shocks beyond the reference year of the database as well as allowing shocks to be added incrementally which is more realistic in reflecting the gradual liberalisation processes. Instead of comparing the baseline and policy outcomes at a fixed point in time, a recursive dynamic CGE model generates future projections and our results are accordingly inferred from the comparisons between baseline and policy projections.

The dynamics in our model require exogenous assumptions on the changes in endowments, technologies, and preferences over time in the baseline. We rely on two sources, a series of medium-run, 5-year forecasts from the IMF which are supplemented with long-run forecasts by the OECD in the Shared Socioeconomic Pathways (SSPs). Specifically, the two data sources allow us to exogenously target GDP, population, changes in labour force composition, productivity growth, saving rates, rising capital income shares through digitalisation, and future changes in trade barriers resulting from the implementation of the Trade Facilitation Agreement and the geopolitical tensions between China and the US[15].

The default in the GTAP model is to assume that the allocation of savings by the global bank is aimed at investing in regions with the highest rate of return on capital until expected rates of return are equalised.[16] By incorporating the impacts of the changes in investment, this particular closure tends to reflect long-run adjustments in the global economy. As a variant, we also explore the results in a medium-run closure under which the trade balance is fixed. The rationale for this specific closure is to cordon off the welfare impacts of investment by limiting international capital flow in the model.[17] To illustrate the importance of investment,

[15]Further details are available in Bekkers et al. (2023)

[16]As part of the CGE simulation setup, researchers would need to decide on the choice of model closures that partition the exogenous and endogenous variables in the model. These are typically selected to reflect the underlying modelling and economic environments. For example, in short-run models with downward wage rigidities, labour supply may be endogenised by fixing the real wage while allowing employment to adjust. In our modelling, we adopt the standard long-run setting with the exception being the macro closure relating to global savings.

[17]Note that by adopting this specific closure, we must designate one region as the lender/borrower of last resort and exclude it from the analysis. For this, we have selected the rest of the world (non-participant) region (see Table 3).

we present the simulation results under both closures in the subsequent sections.

Finally, the services trade data in the GTAP Data Base, Version 11, are based on the BaTIS database, the same data used in our gravity estimation. It is important to note that conceptually, the balance of payment data corresponds to modes 1, 2, and 4 of services supply and omits mode 3. In the CGE literature, mode 3 services trade is typically implemented by extending the CES and Armington nested structures to distinguish between final goods, intermediate goods, or capital (value-added) by ownership (Petri, 1997; Dee and Hanslow, 2000; Lakatos and Fukui, 2014). To include foreign affiliate sales (FAS) through mode 3 would require detailed global FDI and FATS datasets matching the reference year, sector and region dimensions of the GTAP 11 database. However, such a database is currently not yet available.[18]

b) Aggregation of Regions and Sectors

We work with the latest version of the GTAP Data Base, Version 11, with 158 regions and 65 sectors for 2017. As shown in Table 3, we have aggregated them into 30 regions and 10 sectors for the simulations. We aim to capture most of the major G20 economies while other economies are grouped by their geographical locations such as Southeast Asia and Latin America. Moreover, some aggregate regions such as Latin America are further separated by their participation status in the SDR with the subscripts 0 and 1 indicating participation. For the aggregated regions consisting of economies participating in the SDR the AVE cost reductions are based on a trade-weighted average of changes in the SDR Index. Since the SDR Index is only available for 55 out of 70 participants in the SDR outcome, the AVE cost reductions for the 15 missing economies are proxied based on averages by sector and income group.

We have aggregated the sectors into primary, mining, manufacturing and seven service sectors. All six service sectors covered in our gravity estimation and computation of AVE cost reductions are represented individually with a residual 'other services' sector capturing the remaining services sectors. A detailed concordance between the aggregated regions/sectors and the full GTAP list is available in Table B1 and Table B2 of the appendix.

[18] At the time of writing, researchers at the WTO are extending the WTO Global Trade Model to include FDI and affiliate sales as well as constructing the required datasets. Consequently, we are unable to employ them in this study.

Table 3: Aggregate Region and Sector List for CGE Simulation

Aggregated Region List (31 Regions)			
SDR Participants (20 Regions)		**Non-Participants (11 Regions)**	
SEA_1	Southeast Asia (SDR Participant)	SEA_0	Southeast Asia (Non-Participant)
LAC_1	Latin America (SDR Participant)	LAC_0	Latin America (Non-Participant)
MIN_1	Middle East and North Africa (SDR Participant)	MIN_0	Middle East and North Africa (Non-Participant)
SSO_1	Other Sub-Saharan Africa Economies (SDR Participant)	SSO_0	Other Sub-Saharan Africa Economies (Non-Participant)
ROW_1	Rest of World (SDR Participant)	ROW_0	Rest of World (Non-Participant)
ANZ	Australia and New Zealand	IND	India
CHN	China	IDN	Indonesia
KOR	Korea, Republic of	OAS	Other Asian Economy
HNT	Hong Kong, China and Chinese Taipei	ASL	Asian LDC
JPN	Japan	SSL	Sub-Saharan Africa LDC
CAN	Canada	ZAF	South Africa
USA	United States of America		
MEX	Mexico		
BRA	Brazil		
E27	European Union 27		
GBR	United Kingdom		
EFT	European Free Trade Association		
RUS	Russian Federation		
TUR	Türkiye		
SAU	Saudi Arabia, Kingdom of		
Aggregate Sector List			
PRI	Primary (Agriculture)	MIN	Mining and quarrying
MAN	Manufacturing	WHOREP	Wholesale and trade
TPST	Transport	INFCOM	Communication
FIN	Finance	INS	Insurance
PROF	Professional Services	OTS	Other Services (residuals)

5.2 Design of Policy Shocks

a) Modelling Non-Tariff Measures

There are numerous approaches to incorporate the estimated AVE trade cost reductions into the CGE model as policy shocks. In our application, we have chosen to represent these reductions as decreases in iceberg trade costs, a concept originally proposed by Samuelson (1954). An intuitive explanation for this type of cost is to consider goods and services being 'melted' away when crossing international borders. Hence, for every unit demanded by the importer, the exporter must ship more than one unit which would subsequently lead to price wedges between the two parties. Therefore, iceberg trade cost reductions can be interpreted as resource-saving measures or efficiency gains, since fewer units have to be shipped out.

Another commonly applied approach is to model the AVE trade cost reductions as reductions in tariffs. The key factor here is to determine whether the NTMs in question generate rents

for either the importer or exporter. If yes, then the modelling of these trade cost reductions as tariffs (or export taxes) would be more appropriate. As discussed earlier, the provisions in the SDR Reference Paper are non-discriminatory and primarily of a procedural nature. The SDR disciplines seek to ensure that, where licensing requirements exist, foreign service suppliers can apply for market entry with the underlying procedures being transparent, predictable, and facilitative. They administer but do not impose any new market access barriers. As a result, they should not generate rents and the tariff-equivalent approach would be less accurate in depicting the effects of the SDR.

Finally, an alternative method of implementing changes in non-discriminatory NTMs is based on the 'willingness-to-pay' module proposed by Walmsley and Minor (2020). The AVEs are implemented as shifts and rotations of the utility function so less quantity is required to obtain a given level of utility. The authors have applied it to the Trade Facilitation Agreement at the WTO with importers exhibiting a higher willingness to pay for goods that are delivered quicker. Although we could follow the same approach, the decision to model the shocks as changes in iceberg trade costs reflects our assessment that the SDR Reference Paper primarily leads to cost reductions for foreign service providers on the supply side. Nevertheless, it should be noted that certain SDR disciplines can have the effect of reducing undue delays in the processing and granting of licenses.

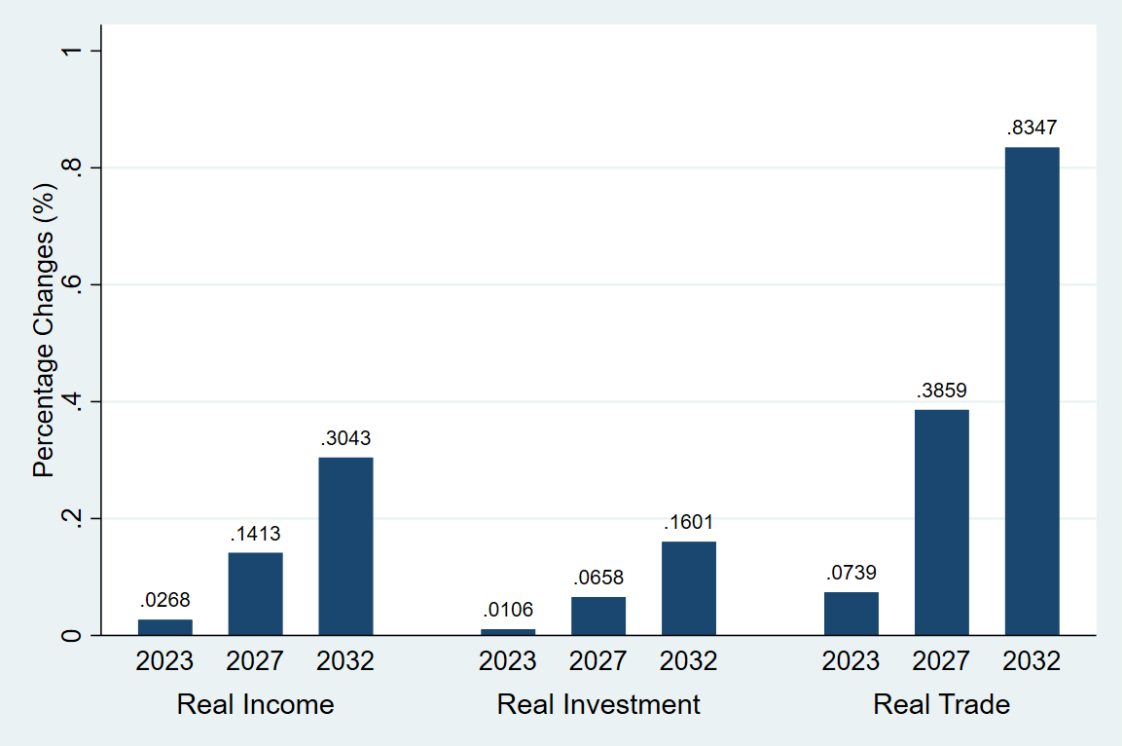
b) Implementation

In our model, shocks to iceberg trade costs are implemented with the variable *itc* which is the inverse of the variable *ams* in the GTAP model in levels (i.e. in percentage changes $itc = -ams$). For regions participating in the SDR outcome, these iceberg trade cost reductions are applied to all regions to reflect the non-discriminatory nature of the provisions in the Reference Paper.[19]. There is, however, one exception: given the uniquely deep integration in Europe, we assume that the SDR disciplines would bring no further reduction of trade costs for trade between economies of the European Union (E27), the United Kingdom (GBR) and the European Free Trade Association (EFTA). This is also in line with the WTO and OECD (2021) policy brief which evaluated the impacts of the SDR disciplines within Europe using the Intra-EEA STRI and found that there will be limited liberalisation.

Finally, we assume that the participants will start implementing the SDR disciplines in 2023. Note that while Members will be required to legally comply with the disciplines upon entry into force, a large number of built-in flexibilities allow for incremental implementation of the full substance of the disciplines. We assume that on average, Members will fully implement the substance of the disciplines over 10 years and this is implemented in the model with

[19]Note that for non-economy regions such as Latin America and Southeast Asia, the reductions of iceberg trade costs apply to the regions themselves to capture within-region liberalisation.

Figure 4: Percentage Change in real World Income, Export, and Investment under **Fixed-Trade-Balance Closure**



Displayed results are relative to the baseline projection

equal and incremental reductions in iceberg costs every year[20].

5.3 Simulation Results

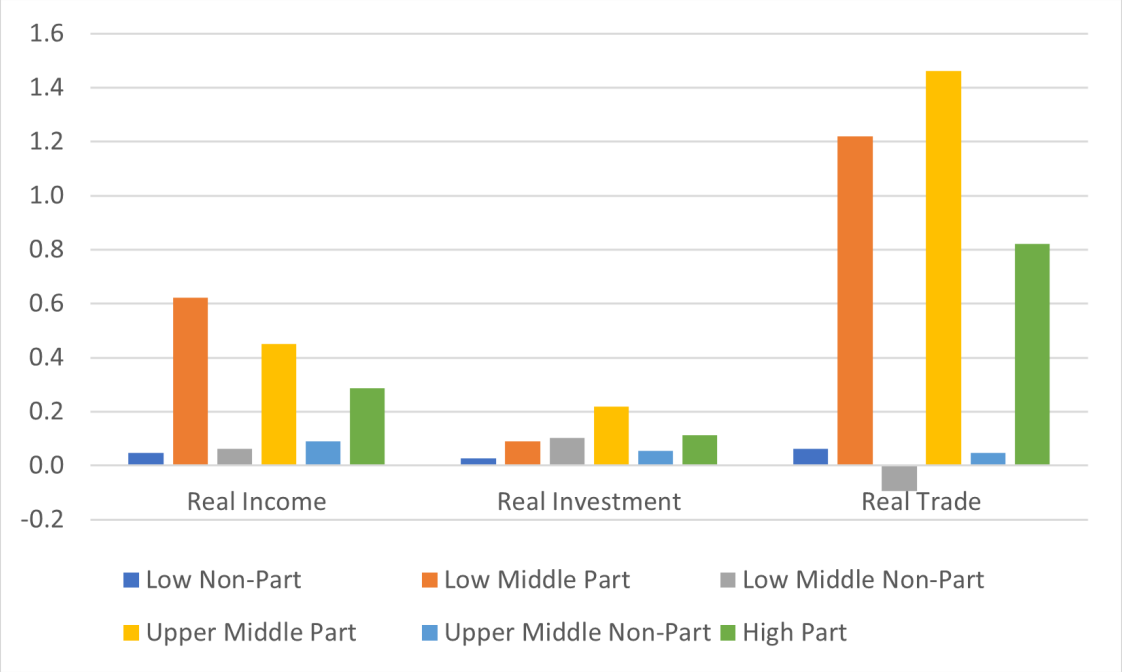
a) Aggregate Macroeconomic Results

The outputs of CGE simulations are generally presented relative to a baseline scenario, i.e., a projection without the policy shock of interest. In contrast to forecasting the increase or reduction of various macro indicators, our results show the projected differences relative to the baseline. As discussed above, we present results under both the fixed-trade-balance and rate-of-return closures which serve to capture the medium- and long-run impacts respectively.

Figure 4 displays the projected changes in three main macroeconomic variables at the global level in the first (2023), fifth (2027) and final (2032) year of full implementation of the SDR discipline under the fixed-trade-balance closure. At the global level, the economic effects of the SDR disciplines are modest but undoubtedly positive. The biggest change comes from the increase in real world exports at 0.835% relative to the baseline after 10 years. The

[20]For example, a 0.77% annual reduction corresponds to a cumulative 7.98% reduction in trade costs over 10 years.

Figure 5: Percentage Change in real World Income, Export, and Investment under **Fixed-Trade-Balance Closure** for Different Income Groups Split between Participants and Non-Participants



The figure displays the per cent change in real income, real investment and real exports projected for 2032 for different income groups split between participants and non-participants, calculated as the value weighted average of regional results using the baseline values of GDP, the value investment, and the value of exports (FOB) in 2022. GDP per capita of the regions in the simulations are employed with the income brackets from the World Bank for 2022. Low income: $1,135 or less; lower-middle income: between $1,136 and $4,465; upper-middle income: between $4,466 and $13,845; high income: $13,846 or more. No low-income economies participate in the SDR and there are no non-participants among the high-income regions in the simulations. Both groups are omitted from the figure.

projected changes in real world income and investment stand at around 0.3% and 0.16% in 2032 respectively. In dollar terms, the above percentage changes correspond to respectively 301 and 206 billion USD increases in respectively real income and real exports based on multiplying the percentage changes with the projected global value of GDP and exports in 2032. The macro results under the rate-of-return closure are presented in Figure C1 of the appendix. They are very similar which implies that the closure does not affect the results at the global level.

Figure 5 displays the projected change in real income, real investment, and real exports for the different income groups split up between participants and non-participants in the SDR Agreement. The figure generates three main messages. First, the difference in projected real income and real exports between participants and non-participants is very clear for the two income groups (lower middle income and upper middle income) which have both participants

Table 4: Macroeconomic Effects by Region under **Fixed-Trade-Balance Closure**

Regions	Real Income	Real Investment	Real Export	ΔExport ($bn)
Australia and New Zealand*	0.484	0.219	1.070	4.56
China*	0.377	0.218	1.936	54.62
Hong Kong, China and Chinese Taipei*	0.801	0.312	0.160	1.05
Japan*	0.086	-0.002	0.191	2.13
Korea, Republic of*	0.435	0.145	0.900	8.17
India	0.033	0.037	-0.165	-1.34
Indonesia	0.017	0.009	0.036	0.09
Southeast Asia (JSI Participant)*	1.546	0.654	0.847	7.64
Southeast Asia (Non-Participant)	0.043	0.046	-0.151	-1.19
Asian LDC	0.007	0.003	-0.125	-0.25
Other Asian Economy	0.104	0.089	0.079	0.13
Canada*	0.303	0.080	0.624	2.90
United States of America*	0.210	0.088	1.235	33.16
Mexico*	0.360	0.037	0.529	2.88
Brazil*	0.340	0.084	2.378	4.10
Latin America (JSI Participant)*	0.449	0.075	1.512	6.59
Latin America (Non-Participant)	0.194	0.094	0.450	1.46
European Union 27*	0.293	0.078	0.896	56.25
United Kingdom*	0.435	0.265	0.500	2.45
European Free Trade Association*	0.350	0.146	0.509	2.92
Russian Federation*	0.515	0.096	0.959	6.27
Middle East and North Africa (JSI Participant)*	0.679	0.341	1.258	1.50
Middle East and North Africa (Non-Participant)	0.069	0.040	0.078	0.98
Saudi Arabia, Kingdom of*	0.474	0.245	0.182	0.68
Türkiye*	0.741	0.359	1.483	5.21
Other Sub-Saharan Africa Economies (JSI Participant)*	0.622	0.090	1.221	1.42
Other Sub-Saharan Africa Economies (Non-Participant)	0.076	0.042	0.121	0.21
Sub-Saharan Africa LDC	0.083	0.049	0.214	0.54
South Africa	0.072	0.037	-0.059	-0.07
Rest of World (JSI Participant)*	0.686	0.218	0.739	1.32
Rest of World (Non-Participant)†	0.454	2.044	-0.309	-0.62

Displayed results are the 2032 cumulative percentage change relative to the baseline projection
Regions appear in the same order as in the GTAP Data Base, starting with Oceania, then Asia, America, Europe, the Middle East, and Africa
*Indicates regions participating in the SDR outcome
†Indicates the residual region that functions as the lender/borrower of last resort

and non-participants. Second, although real exports are falling for non-participating lower middle income economies, real income and real investment increase slightly for all income groups of non-participating economies. The reason is that these economies also benefit from the streamlining of procedures in the other regions leading to higher real income and investment, whereas in terms of real exports the shifting away of exports towards participants dominates. Third, the largest changes in real income are projected for the lower middle income participating economies, whereas the largest changes in real exports are projected for upper middle income economies.

Table 5: Macroeconomic Effects by Region under **Rate-of-Return Closure**

Regions	Real Income	Real Investment	Real Export	ΔExport ($bn)
Australia and New Zealand*	0.522	0.651	0.853	3.63
China*	0.380	0.298	1.728	48.75
Hong Kong, China and Chinese Taipei*	0.920	1.617	-0.003	-0.02
Japan*	0.025	-0.781	0.476	5.31
Korea, Republic of*	0.473	0.531	0.765	6.94
India	-0.026	-0.494	0.347	2.82
Indonesia	-0.116	-0.801	1.369	3.58
Southeast Asia (JSI Participant)*	1.767	2.463	0.655	5.91
Southeast Asia (Non-Participant)	-0.029	-0.556	-0.147	-1.16
Asian LDC	-0.084	-0.702	0.230	0.47
Other Asian Economy	0.064	-0.276	0.191	0.32
Canada*	0.309	0.147	0.598	2.78
United States of America*	0.197	-0.097	1.360	36.51
Mexico*	0.306	-0.476	0.620	3.37
Brazil*	0.309	-0.234	2.999	5.17
Latin America (JSI Participant)*	0.443	0.018	1.528	6.66
Latin America (Non-Participant)	0.161	-0.300	0.594	1.92
European Union 27*	0.276	-0.055	0.919	57.73
United Kingdom*	0.670	1.828	-1.329	-6.52
European Free Trade Association*	0.369	0.470	0.432	2.48
Russian Federation*	0.533	0.396	0.912	5.96
Middle East and North Africa (JSI Participant)*	0.767	0.996	0.905	1.08
Middle East and North Africa (Non-Participant)	-0.011	-0.617	0.137	1.73
Saudi Arabia, Kingdom of*	0.493	0.422	0.190	0.71
Türkiye*	0.824	0.964	1.243	4.37
Other Sub-Saharan Africa Economies (JSI Participant)*	0.642	0.179	1.251	1.45
Other Sub-Saharan Africa Economies (Non-Participant)	-0.028	-0.650	0.281	0.49
Sub-Saharan Africa LDC	-0.032	-0.621	0.429	1.08
South Africa	0.028	-0.550	0.096	0.12
Rest of World (JSI Participant)*	0.723	0.673	0.715	1.28
Rest of World (Non-Participant)	0.172	0.013	-0.112	-0.23

Displayed results are the 2032 cumulative percentage change relative to the baseline projection
*Indicates regions participating in the SDR outcome

Next, Table 4 displays the above macro indicators disaggregated by 30 regions under the fixed-trade-balance closure. For ease of comparison, we only present the cumulative results in the year 2032. Note that as discussed previously, the 'Rest of World (Non-Participant)' region is selected as the lender/borrower of last resort due to our macro closure concerning global savings, we therefore do not interpret the results of the residual region. Overall, with the exception of real exports among non-participating Asian regions, almost every region sees their real income, exports and investment projected to increase relative to the

baseline. Finally, the rightmost column displays the changes in real exports in billion USD. As expected, changes in absolute trade volume depend on the economic size of the region with the largest gains observed in China, the European Union and the US.

The results are largely expected given the non-discriminatory nature of the SDR provisions which is reflected in our implementation of policy shocks. In other words, non-participants also benefit from the reduction in iceberg trade costs from regions participating in the SDR outcome. However, it is also clear that participating regions are projected to display larger increases for all three macro indicators whereas those increases for non-participants are generally below 0.1%.

At the economy level, the effect of the macro closure is significant. Table 5 provides a comparison under the rate-of-return closure, a representation of the potential long-run state of the global economy. We observe significant distributional effects on real investment: relative to the baseline projection, investment is projected to flow out of non-participating into participating regions. Consequently, the small but positive increase in real income under the fixed-trade-balance closure no longer holds. In contrast, most non-participating regions are now projected to have slightly lower real income relative to the baseline. Nonetheless, it is worth noting that the trade-promoting effects of the SDR disciplines are still present as most regions continue to enjoy higher real exports relative to the baseline.

b) Implications for Intermediate Input Prices

To illustrate how the SDR Reference Paper can help importing firms in participating economies, we explore the projected changes in intermediate input prices. The impacts of the SDR disciplines on production costs under the fixed-trade-balance closure are shown in Table 6, which displays the projected changes in intermediate input prices by sector and region. We again present the results for the year 2032 for ease of comparison.

First, at the economy level, we observe broad reductions in input prices regardless of participation status. The only exceptions are the region 'other Asian economy' and non-participants in Latin America – 2 out of 11 non-participating regions. Similarly, the cost reductions are higher among participants of the SDR outcome.

At the sector level, although we certainly expect input price reductions in the six service sectors with iceberg cost reduction, there are significant spillover effects on the primary, secondary, and residual service sectors. This is intuitive given the importance of services in GVCs with them accounting for a growing share of inputs across both services and goods sectors. Additionally, among the regions participating in the SDR outcome, the intermediate cost reductions in the six service sectors which we have shocked are generally higher than the others. On the other hand, the cost reductions among non-participants are similar across all

Table 6: Changes in Intermediate Input Prices by Sector and by Region under **Fixed-Trade -Balance Closure**

Region	PRI	MIN	MAN	WHOREP	TPST	INFCOM	PROF	FIN	INS	OTS
Australia and New Zealand*	-0.900	-0.580	-0.537	-0.942	-0.763	-1.180	-0.650	-0.735	-0.905	-0.779
China*	-0.602	-0.628	-0.642	-0.879	-0.927	-0.993	-0.801	-0.701	-0.881	-0.669
Hong Kong, China and Chinese Taipei*	0.075	-0.130	-0.079	-0.268	-0.024	-0.261	-0.185	-0.211	0.111	-0.218
Japan*	-0.270	-0.285	-0.266	-0.313	-0.351	-0.316	-0.315	-0.351	-0.339	-0.287
Korea, Republic of*	-0.403	-0.555	-0.572	-0.732	-1.652	-1.184	-0.709	-0.867	-1.006	-0.440
India	0.020	-0.010	-0.093	-0.016	-0.032	0.016	0.030	0.060	0.058	-0.010
Indonesia	-0.249	-0.233	-0.248	-0.235	-0.255	-0.243	-0.230	-0.242	-0.262	-0.236
Southeast Asia (SDR Participant)*	-0.255	-0.765	-0.611	-2.483	-2.146	-4.574	-3.194	-4.400	-4.690	-0.597
Southeast Asia (Non-Participant)	-0.272	-0.248	-0.284	-0.245	-0.263	-0.228	-0.227	-0.172	-0.206	-0.237
Asian LDC	-0.239	-0.225	-0.230	-0.201	-0.227	-0.205	-0.222	-0.203	-0.202	-0.215
Other Asian Economy	-0.036	0.047	-0.033	0.143	0.048	0.151	0.116	0.174	0.207	0.094
Canada*	-0.311	-0.457	-0.303	-0.647	-0.438	-0.828	-0.525	-0.932	-1.067	-0.397
United States of America*	-0.107	-0.107	-0.256	-0.099	-0.201	-0.249	-0.094	-0.080	-0.216	-0.166
Mexico*	-0.461	-0.859	-0.409	-1.284	-1.062	-0.805	-0.762	-0.669	-2.665	-0.625
Brazil*	-0.455	-1.404	-0.548	-1.067	-0.738	-1.379	-1.144	-1.692	-1.196	-0.777
Latin America (SDR Participant)*	-0.584	-0.668	-0.606	-0.873	-0.902	-1.359	-0.904	-1.324	-1.740	-0.695
Latin America (Non-Participant)	0.293	0.301	0.195	0.443	0.100	0.437	0.384	0.452	0.397	0.318
European Union 27*	-0.711	-0.836	-0.773	-1.082	-1.036	-1.227	-1.124	-1.536	-1.411	-0.847
United Kingdom*	-1.328	-0.754	-0.766	-1.189	-1.146	-1.561	-1.192	-1.756	-1.379	-0.846
European Free Trade Association*	-0.573	-0.743	-0.618	-0.986	-0.799	-0.901	-0.841	-1.065	-1.196	-0.690
Russian Federation*	-0.476	-0.660	-0.525	-0.866	-0.755	-1.603	-1.226	-1.846	-2.530	-0.660
Middle East and North Africa (SDR Participant)*	-0.356	-0.987	-0.419	-0.746	-1.434	-0.815	-0.749	-1.361	-1.394	-0.464
Middle East and North Africa (Non-Participant)	-0.099	-0.168	-0.163	-0.061	-0.162	-0.070	-0.069	-0.006	-0.021	-0.119
Saudi Arabia, Kingdom of*	-0.645	-1.882	-0.468	-1.256	-0.429	-1.266	-1.855	-2.265	-2.913	-0.827
Türkiye*	-0.351	-1.167	-0.573	-1.644	-0.901	-3.829	-3.230	-2.822	-8.767	-1.062
Other Sub-Saharan Africa Economies (SDR Participant)*	-0.678	-1.621	-0.498	-1.777	-0.863	-3.024	-2.021	-3.704	-1.819	-1.139
Other Sub-Saharan Africa Economies (Non-Participant)	-0.128	-0.104	-0.141	-0.083	-0.190	-0.083	-0.098	-0.093	-0.082	-0.121
Sub-Saharan Africa LDC	-0.121	-0.099	-0.117	-0.088	-0.202	-0.101	-0.093	-0.072	-0.064	-0.132
South Africa	-0.127	-0.086	-0.151	-0.044	-0.115	-0.131	-0.043	-0.032	-0.033	-0.089
Rest of World (SDR Participant)*	-0.473	-0.601	-0.386	-1.110	-0.609	-1.394	-0.765	-0.804	-0.855	-0.435
Rest of World (Non-Participant)†	-0.012	0.042	-0.094	0.110	-0.086	0.119	0.160	0.186	0.201	0.032

Displayed results are the 2032 cumulative percentage change relative to the baseline projection, the results are based on the AVE cost reductions from the benchmark specification

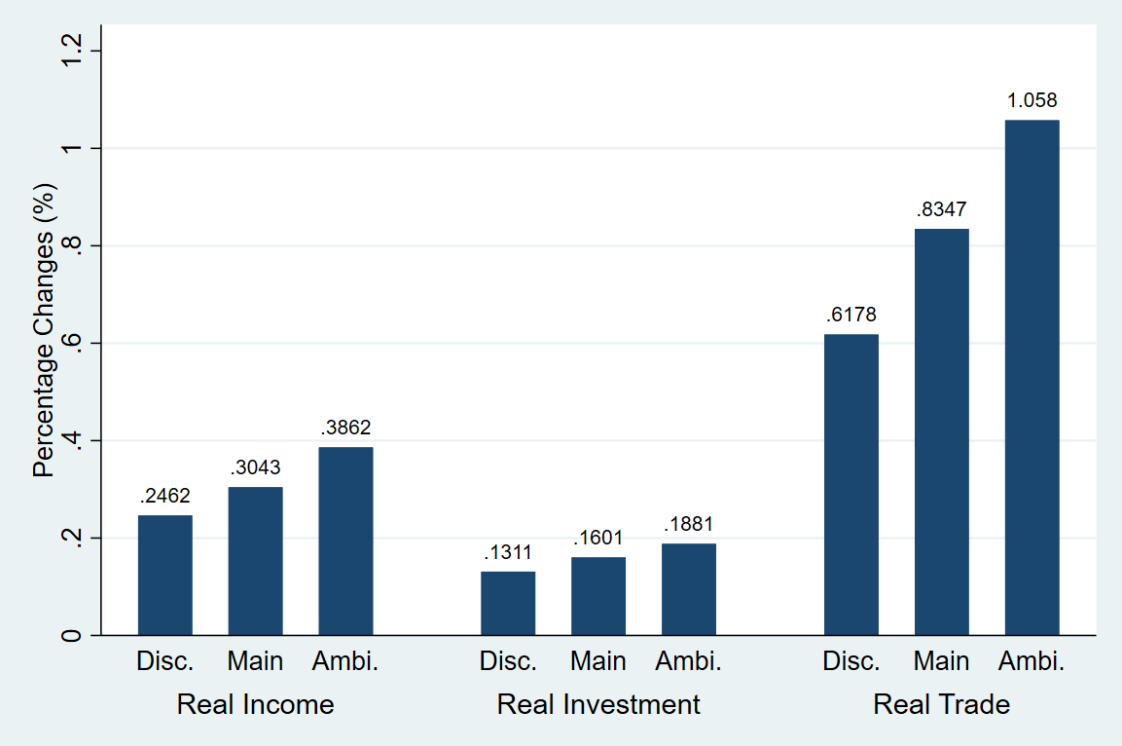
*Indicates regions participating in the SDR outcome

†Indicates the residual region that functions as the lender/borrower of last resort

sectors. This is expected as they only indirectly benefit from the lower cost in those regions participating in the SDR outcome.

The changes in intermediate input prices under the rate-of-return closure are similar (see Appendix Table C1). As discussed above, the different macro closures primarily affect economy-level income and investment. In contrast, their impacts on trade and intermediate input

Figure 6: Comparison of Macro Indicators between the Discriminatory, Main/Staus-quo, and Ambitious Scenario under **Fixed-Trade-Balance Closure**



Displayed results are the 2032 cumulative percentage change relative to the baseline projection

prices are relatively small.

c) Hypothetical Scenarios

For further analysis, we introduce two hypothetical scenarios to explore other policy implications of the SDR outcome. First, we simulate a scenario where all WTO Members would implement the disciplines in the SDR Reference Paper. As a motivation for this scenario, we observe that the SDR negotiation was launched with 59 Members in 2017 and at the time of writing, the recent inclusion of Timor-Leste, the first LDC in the SDR Outcome, had brought the total number of participants to 70. To augment the existing policy shock equations, we have to rely on approximations as the SDR Index only has scores for 31 Members that are currently not part of the SDR outcome. For those economies that are not covered by the SDR Index, we once again adopted extrapolated values by averaging AVEs across sectors and income groups.[21]

The second scenario highlights the non-discriminatory aspect of the SDR-related provisions.

[21]In addition, we have also taken into account the fact that even with the participation of all 164 WTO Members, the AVE cost reductions for economies that are not Members or those that are currently acceding to the WTO would still be zero. As a result, the AVE cost reductions in aggregate regions with many small island states such as 'other Asian economy' and 'rest of world (non-participants)' would be smaller when trade-weighted averages are taken.

Table 7: Macroeconomic Effects by Region under **Fixed-Trade-Balance Closure** (Ambitious Scenario)

Regions	Real Income	Real Investment	Real Export	ΔExport ($bn)
Australia and New Zealand*	0.485	0.220	1.094	4.66
China*	0.379	0.219	1.942	54.79
Hong Kong, China and Chinese Taipei*	0.857	0.336	0.084	0.55
Japan*	0.088	-0.002	0.175	1.95
Korea, Republic of*	0.443	0.148	0.868	7.88
India	0.434	0.205	2.124	17.29
Indonesia	0.507	0.181	1.729	4.53
Southeast Asia (JSI Participant)*	1.615	0.705	0.727	6.56
Southeast Asia (Non-Participant)	1.187	0.239	1.278	10.06
Asian LDC	0.646	0.299	1.652	3.35
Other Asian Economy	0.506	0.306	1.587	2.70
Canada*	0.300	0.078	0.597	2.77
United States of America*	0.223	0.095	1.286	34.52
Mexico*	0.359	0.037	0.492	2.68
Brazil*	0.339	0.085	2.362	4.07
Latin America (JSI Participant)*	0.451	0.076	1.525	6.64
Latin America (Non-Participant)	0.823	0.224	2.052	6.65
European Union 27*	0.305	0.082	0.851	53.43
United Kingdom*	0.459	0.280	0.436	2.14
European Free Trade Association*	0.353	0.148	0.473	2.71
Russian Federation*	0.509	0.094	0.966	6.32
Middle East and North Africa (JSI Participant)*	0.706	0.361	1.227	1.46
Middle East and North Africa (Non-Participant)	0.413	0.168	0.562	7.09
Saudi Arabia, Kingdom of*	0.476	0.246	0.200	0.74
Türkiye*	0.758	0.370	1.461	5.13
Other Sub-Saharan Africa Economies (JSI Participant)*	0.631	0.100	1.323	1.54
Other Sub-Saharan Africa Economies (Non-Participant)	0.815	0.414	1.408	2.44
Sub-Saharan Africa LDC	1.106	0.474	2.169	5.47
South Africa	0.538	0.110	1.204	1.51
Rest of World (JSI Participant)*	0.680	0.217	0.746	1.33
Rest of World (Non-Participant)†	0.645	2.582	-0.172	-0.35

Displayed results are the 2032 cumulative percentage change relative to the baseline projection

*Indicates regions participating in the SDR outcome

†Indicates the residual region that functions as the lender/borrower of last resort

While only participants in the outcome are bound by the SDR disciplines, service suppliers from non-participating economies likewise benefit from the implementation of these obligations when they trade with participating economies. This non-discrimination with regard to the beneficiaries of the disciplines is an important element of the outcome's legitimacy. To illustrate the importance of non-discrimination, we explore a hypothetical scenario where cost reductions would only be applied to fellow participants of the SDR outcome and the

policy shocks are modified accordingly. It is important to emphasize that this is only a thought experiment since facilitation-related policies such as those under the SDR Reference paper benefit all potential importers by design.

The global macroeconomic effects of the two scenarios under the fixed-trade-balance closure as well as our main simulation results from Figure 4 are presented together in Figure 6. For ease of comparison, we only compare the results for 2032. In summary, gains in real income, investment, and export from the status quo (i.e. main simulation) scenario are in between the two hypothetical scenarios. Specifically, they are smaller than those in the ambitious scenario and larger than those in the discriminator scenario. However, at the global level, the magnitude of the changes is small: for real income and investment, the differences are less than 0.1 percentage points. This is expected as the 70 participating Members of the SDR outcome account for over 90% of global services trade even if they account for less than half of all WTO Members.[22]

Next, Table 7 displays the macro indicators at the economy level under the ambitious scenario (with fixed-trade-balance closure). Compared to our main simulation results in Table 4, there are sharp contrasts between participants and non-participants of the SDR outcome. Among participating Members, the macro impacts of the SDR outcome are virtually the same across the three indicators, most likely due to the limited gains that can be achieved from non-participating Members that are much smaller in terms of economic size and trade volumes. On the other hand, we observe large projected welfare and trade increases among currently non-participating Members, and the magnitude of changes are often higher than for the original participants. The outcomes are particularly encouraging given that most of them are developing countries or LDCs, which again reaffirms the importance of multilateral engagement to maximise the potential gains of the SDR disciplines.

Lastly, the results under the discrimination scenario (with fixed-trade-balance closure) are shown in Table 8. We find that non-participants would lose across most indicators, thus highlighting the importance of an open approach to plurilateral outcomes. Furthermore, when comparing against the current approach displayed in Table 4, we see that the gains for SDR participants are not larger if the implementation of SDR disciplines is discriminatory. Hence, the SDR Reference Paper is not a zero-sum type of outcome but would instead enable economies to reap mutually beneficial gains from trade.

[22]Similar to the main results, the choice of macro closure does not have a significant impact on the global macroeconomic effects. They are reported in Appendix Figure C2 for completeness.

Table 8: Macroeconomic Effects by Region under **Fixed-Trade-Balance Closure** (Discriminatory Scenario)

Regions	Real Income	Real Investment	Real Export	ΔExport ($bn)
Australia and New Zealand*	0.397	0.179	0.985	4.19
China*	0.313	0.178	1.598	45.08
Hong Kong, China and Chinese Taipei*	0.899	0.362	-0.070	-0.46
Japan*	0.085	-0.001	0.099	1.10
Korea, Republic of*	0.402	0.137	0.694	6.30
India	-0.046	-0.044	0.189	1.54
Indonesia	-0.020	-0.012	-0.160	-0.42
Southeast Asia (JSI Participant)*	1.425	0.639	0.559	5.04
Southeast Asia (Non-Participant)	-0.070	-0.062	0.134	1.05
Asian LDC	0.072	0.039	-0.009	-0.02
Other Asian Economy	-0.144	-0.110	-0.167	-0.28
Canada*	0.261	0.064	0.548	2.54
United States of America*	0.187	0.086	1.037	27.85
Mexico*	0.319	0.032	0.396	2.15
Brazil*	0.303	0.076	2.124	3.66
Latin America (JSI Participant)*	0.391	0.066	1.400	6.10
Latin America (Non-Participant)	-0.207	-0.096	-0.683	-2.21
European Union 27*	0.255	0.071	0.606	38.04
United Kingdom*	0.422	0.252	0.208	1.02
European Free Trade Association*	0.313	0.134	0.346	1.98
Russian Federation*	0.409	0.078	0.869	5.68
Middle East and North Africa (JSI Participant)*	0.667	0.354	1.026	1.22
Middle East and North Africa (Non-Participant)	0.018	0.003	-0.146	-1.84
Saudi Arabia, Kingdom of*	0.356	0.187	0.150	0.56
Türkiye*	0.700	0.348	1.188	4.18
Other Sub-Saharan Africa Economies (JSI Participant)*	0.498	0.082	1.272	1.48
Other Sub-Saharan Africa Economies (Non-Participant)	-0.013	-0.006	-0.183	-0.32
Sub-Saharan Africa LDC	-0.012	-0.005	-0.293	-0.74
South Africa	-0.001	-0.004	-0.004	-0.005
Rest of World (JSI Participant)*	0.561	0.181	0.702	1.25
Rest of World (Non-Participant)†	0.345	4.214	-0.611	-1.23

Displayed results are the 2032 cumulative percentage change relative to the baseline projection
*Indicates regions participating in the SDR outcome
†Indicates the residual region that functions as the lender/borrower of last resort

6 Concluding Remarks

In this paper, we conduct an *ex-ante* assessment of the expected impact of the implementation of the Reference Paper on Services Domestic Regulation. Employing standard state-of-the-art tools in trade policy evaluation, we proceed in three steps. First, we estimate a gravity equation of services trade to identify the impact of the SDR Index, a score reflecting the

current implementation of SDR disciplines, on services trade. Our estimations identify the SDR Index's impacts by interacting it with a border dummy for international trade which serves to evaluate the extent to which a higher score raises international trade relative to domestic purchases. We find a significant positive effect of a higher SDR score on services trade. Second, using a standard approach, the gravity estimates are combined with the expected changes in the SDR Index scores from the full implementation of the SDR provisions to calculate projected changes in trade costs. More specifically, the results indicate substantial reductions in trade costs ranging between 8.5% in high-income countries, 10% in lower-middle-income countries and 14 in upper-middle-income countries. The expected trade cost reductions in dollars are about $127 Billion and thus in line with the OECD estimates of around $150 Billion. Third, we employ the WTO Global Trade Model to generate projections of the medium-run economic effects of the agreement. Global exports are projected to increase by 0.8% (207 billion USD) and global income by 0.3% (302 billion USD). The gains are largest in middle-income countries, whereas the impact on non-participants is projected to be positive but close to zero.

There are three main policy implications of this exercise. First, all economies are projected to benefit from the implementation of the SDR disciplines by the 70 participants. Hence, based on the presented simulations of the projected macroeconomic and trade effects, there do not seem to be economic reasons not to implement the Reference Paper. Note that two caveats are in place. The first caveat is that implementation costs are not modelled. In economies with limited technical capacity, implementing regulatory reforms may require both technology upgrades as well as human resource development. These may in turn require financial resources as well as capacity building. However, Paragraph 12 of Section I of the Reference Paper encourages the provision of technical assistance by Members, to ensure that participating Members can implement the substance of the domestic regulation disciplines. The second potential caveat is that the model assumes that factor markets adjust to shocks. In the short-run, the increased import competition could affect specific sectors adversely. However, these concerns seem less important in dynamic (business) services sectors than in goods sectors. Furthermore, in the medium and especially long run, the gains from smoother trade procedures will far outweigh such short-run costs.

Second, the impacts on non-participants in the outcome are close to zero (although marginally positive) which perhaps eases some concerns from non-participants. A crucial driver of these results is that the SDR disciplines are non-discriminatory and open to all Members, which implies that non-participants also benefit from improved services trade procedures when exporting to the markets of SDR participants. Simulation results presented in this paper show that if the SDR Reference Paper was implemented only for service suppliers from participating Members, non-participants could incur moderate losses because of trade

diversion away from their markets.

Third, although non-participants do not lose from the implementation of the SDR Reference Paper by participants, they would benefit much more if they would participate. We show that if economies currently not participating in the SDR outcome would join later on, their projected income and other macroeconomic indicators would turn from close to zero into positive.

The work can be extended in various directions. First, implementation costs could be added to the analysis. In the first year(s) this could imply negative welfare effects. However, since the implementation costs are imposed once whereas the gains are incurred every year, the implementation costs are expected to be outweighed by the gains over time. Second, the gains from the implementation of the SDR Reference Paper could be modelled as increased willingness to pay as done in some analyses of the effects of the Good Trade Facilitation Agreement. This would not significantly change the projected welfare effects but may impact the projected changes in measured real trade flows.

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Appendix A Structural Gravity Estimation

Table A1: International Services Trade: Approximations for six SDR Sectors into EBOPS 2010 Classification

No	Sector List (SDR Index)	ISIC Code	Approximation to EBOPS 2010	EBOPS Code
1	Transport	H	Transport	SC
2	Finance	K64	Financial services	SG
3	Insurance	K65	Insurance and pension services	SF
4	Telecommunication	J	Telecommunications, computer, and information services	SI
5	Wholesale and Trade	G	Trade-related services	SJ34
6	Professional	M	Other business services **(excluding SJ34)**	SJXSJ34

Appendix B CGE Economy & Sector Concordance

Table B1: GTAP Region Concordance Table (regions appear in the order of the GTAP Data Base)

Aggregated Region	Full Name (Aggregated)	GTAP Region List	Full Name
ANZ	Australia and New Zealand	AUS	Australia
		NZL	New Zealand
CHN	China	CHN	China
HNT	Hong Kong, China and Chinese Taipei	HKG	Hong Kong, China
		TWN	Chinese Taipei
JPN	Japan	JPN	Japan
KOR	Korea, Republic of	KOR	Korea, Republic of
IND	India	IND	India
IDN	Indonesia	IDN	Indonesia
SEA_0	Southeast Asia (Non-Participant)	BRN	Brunei Darussalam
		MYS	Malaysia
		VNM	Viet Nam
SEA_1	Southeast Asia (JSI Participant)	PHL	Philippines
		SGP	Singapore
		THA	Thailand
ASL	Asian LDC	KHM	Cambodia
		BGD	Bangladesh
		LAO	Lao People's Democratic Republic
		NPL	Nepal
		XSE	Rest of Southeast Asia
OAS	Other Asian Economies	XOC	Rest of Oceania
		MNG	Mongolia
		PAK	Pakistan
		LKA	Sri Lanka
		XEA	Rest of East Asia
		XSA	Rest of South Asia
CAN	Canada	CAN	Canada
USA	United States of America	USA	United States of America
MEX	Mexico	MEX	Mexico
BRA	Brazil	BRA	Brazil
LAC_0	Latin America (Non-Participant)	BOL	Bolivia, Plurinational State of
		ECU	Ecuador
		VEN	Venezuela, Bolivarian Republic of
		XSM	Rest of South America
		GTM	Guatemala
		HND	Honduras
		NIC	Nicaragua
		PAN	Panama
		XCA	Rest of Central America
		DOM	Dominican Republic
		JAM	Jamaica
		PRI	Puerto Rico
		TTO	Trinidad and Tobago
		XCB	Caribbean
		XNA	Rest of North America
LAC_1	Latin America (JSI Participant)	ARG	Argentina
		CHL	Chile
		COL	Colombia
		CRI	Costa Rica
		SLV	El Salvador
		PRY	Paraguay
		PER	Peru
		URY	Uruguay

Table B1: (continued)

Aggregated Region	Full Name (Aggregated)	GTAP Economy List	Full Name
E27	European Union 27	AUT	Austria
		BEL	Belgium
		BGR	Bulgaria
		HRV	Croatia
		CYP	Cyprus
		CZE	Czech Republic
		DNK	Denmark
		EST	Estonia
		FIN	Finland
		FRA	France
		DEU	Germany
		GRC	Greece
		HUN	Hungary
		IRL	Ireland
		ITA	Italy
		LVA	Latvia
		LTU	Lithuania
		LUX	Luxembourg
		MLT	Malta
		NLD	Netherlands
		POL	Poland
		PRT	Portugal
		ROU	Romania
		SVK	Slovak Republic
		SVN	Slovenia
		ESP	Spain
		SWE	Sweden
GBR	United Kingdom	GBR	United Kingdom
EFT	European Free Trade Association	CHE	Switzerland
		NOR	Norway
		XEF	Rest of EFTA
RUS	Russian Federation	RUS	Russian Federation
MIN_0	Middle East and North Africa (Non-Participant)	IRN	Iran
		JOR	Jordan
		KWT	Kuwait, the State of
		OMN	Oman
		QAT	Qatar
		ARE	United Arab Emirates
		XWS	Rest of Western Asia
		EGY	Egypt
		MAR	Morocco
		TUN	Tunisia
		XNF	Rest of North Africa
MIN_1	Middle East and North Africa (JSI Participant)	BHR	Bahrain, Kingdom of
		ISR	Israel
SAU	Saudi Arabia, Kingdom of	SAU	Saudi Arabia, Kingdom of
TUR	Türkiye	TUR	Türkiye
SSO_0	Other Sub-Saharan Africa Economies (Non-Participant)	CMR	Cameroon
		CIV	Côte d'Ivoire
		GHA	Ghana
		SEN	Senegal
		XCF	Central Africa
		KEN	Kenya
		BWA	Botswana
		NAM	Namibia
		XSC	Rest of South African Customs
SSO_1	Other Sub-Saharan Africa Economies (JSI Participant)	NGA	Nigeria
		MUS	Mauritius

Table B1: (continued)

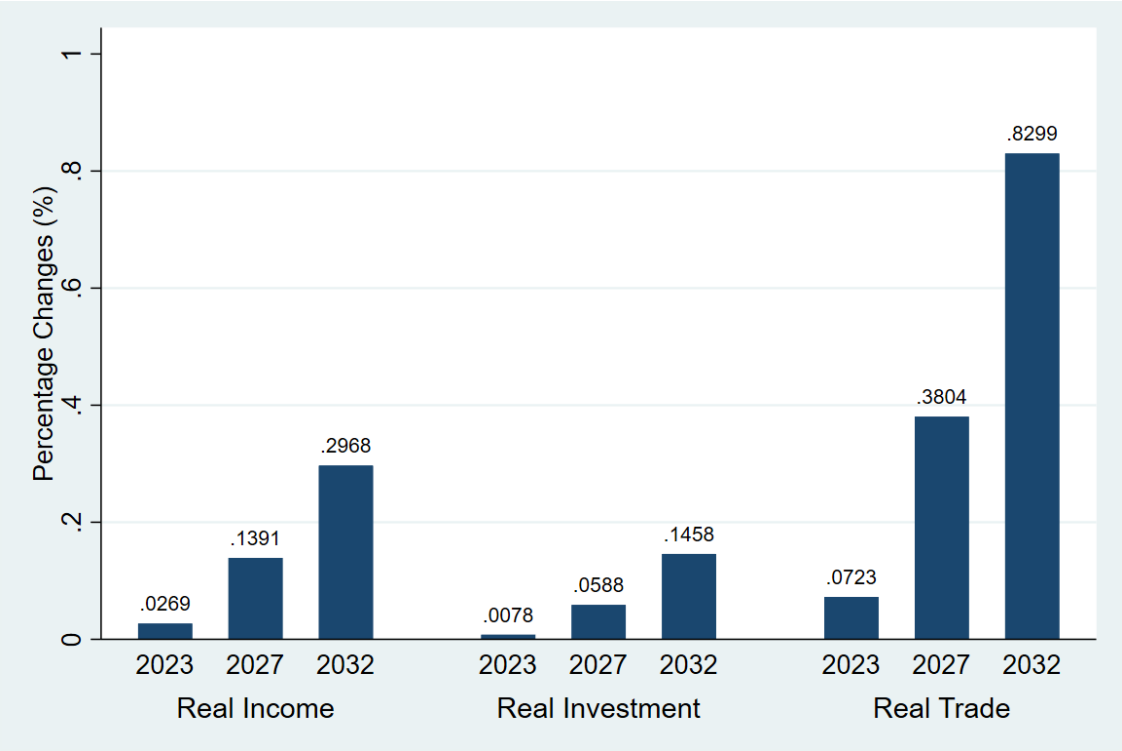
Aggregated Region	Full Name (Aggregated)	GTAP Economy List	Full Name
SSL	Sub-Saharan Africa LDC	BEN	Benin
		BFA	Burkina Faso
		GIN	Guinea
		TGO	Togo
		XWF	Rest of Western Africa
		XAC	South Central Africa
		ETH	Ethiopia
		MDG	Madagascar
		MWI	Malawi
		MOZ	Mozambique
		RWA	Rwanda
		TZA	Tanzania
		UGA	Uganda
		ZMB	Zambia
		ZWE	Zimbabwe
		XEC	Rest of Eastern Africa
ZAF	South Africa	ZAF	South Africa
ROW_0	Rest of World (Non-Participant)	BLR	Belarus
		XEE	Rest of Eastern Europe
		XER	Rest of Europe
		KGZ	Kyrgyz Republic
		TJK	Tajikistan
		XSU	Rest of Former Soviet Union
		ARM	Armenia
		AZE	Azerbaijan
		GEO	Georgia
		XTW	Rest of the World
ROW_1	Rest of World (JSI Participant)	ALB	Albania
		UKR	Ukraine
		KAZ	Kazakhstan

Table B2: GTAP Sector Concordance Table

Aggregated Sectors	Full Descriptions (Aggregated)	GTAP Sector List	Full Description
PRI	Primary sector	pdr	Paddy rice
		wht	Wheat
		gro	Cereal grains nec
		v_f	Vegetables, fruit, nuts
		osd	Oil seeds
		c_b	Sugar cane, sugar beet
		pfb	Plant-based fibers
		ocr	Crops nec
		ctl	Bovine cattle, sheep and goats
		oap	Animal products nec
		rmk	Raw milk
		wol	Wool, silk-worm cocoons
		frs	Forestry
		fsh	Fishing
MIN	Mining and quarrying	coa	Coal
		oil	Oil
		gas	Gas
		oxt	Minerals nec
MAN	Manufacturing	cmt	Bovine meat products
		omt	Meat products nec
		vol	Vegetable oils and fats
		mil	Dairy products
		pcr	Processed rice
		sgr	Sugar
		ofd	Food products nec
		b_t	Beverages and tobacco products
		tex	Textiles
		wap	Wearing apparel
		lea	Leather products
		lum	Wood products
		ppp	Paper products, publishing
		p_c	Petroleum, coal products
		chm	Chemical products
		bph	Basic pharmaceutical products
		rpp	Rubber and plastic products
		nmm	Mineral products nec
		i_s	Ferrous metals
		nfm	Metals nec
		fmp	Metal products
		ele	Computer, electronic and optical products
		eeq	Electrical equipment
		ome	Machinery and equipment nec
		mvh	Motor vehicles and parts
		otn	Transport equipment nec
		omf	Manufactures nec
WHOREP	**Wholesale and trade**	trd	Trade
TPST	**Transport**	otp	Transport nec
		wtp	Water transport
		atp	Air transport
		whs	Warehousing and support activities
INFCOM	**Communication**	cmn	Communication
FIN	**Finance**	ofi	Financial services nec
INS	**Insurance**	ins	Insurance
PROF	**Professional Services**	obs	Business services nec
OTS	Other services (residuals)	afs	Accommodation, Food and service activities
		ely	Electricity
		gdt	Gas manufacture, distribution
		wtr	Water
		cns	Construction
		rsa	Real estate activities
		ros	Recreational and other service
		osg	Public Administration and defense
		edu	Education
		hht	Human health and social work activities
		dwe	Dwellings

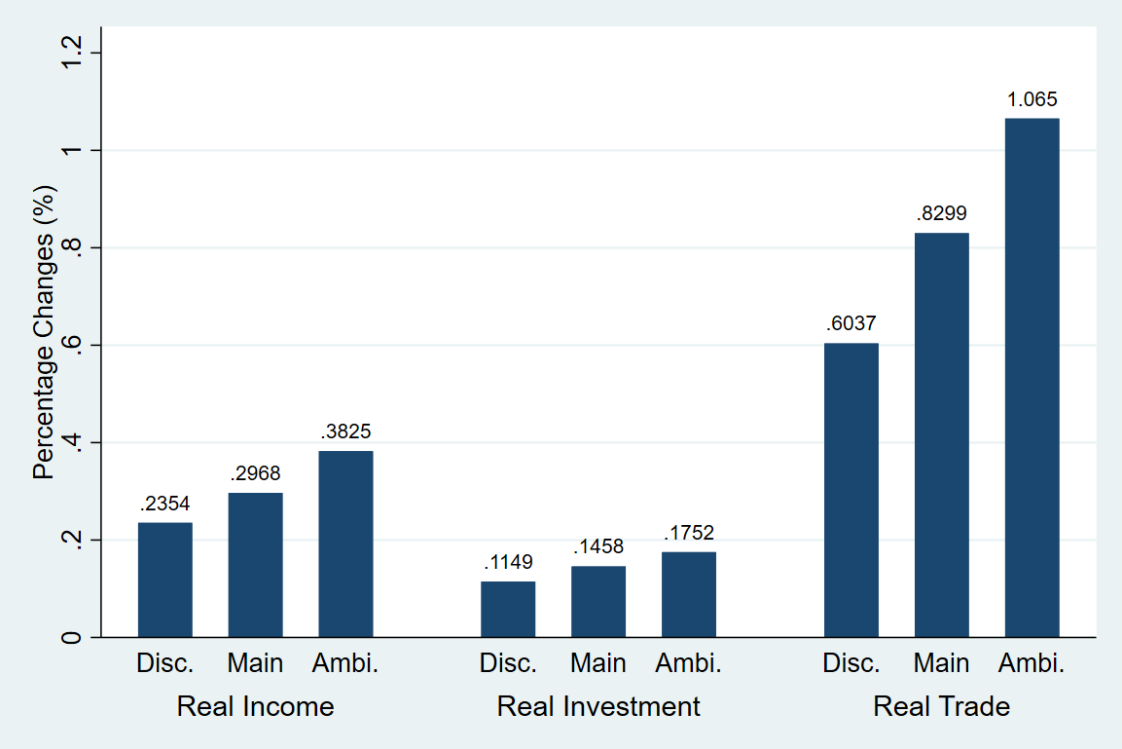
Appendix C Additional Simulation Results

Figure C1: Percentage Change in Real World Income, Export, and Investment under **Rate-of-Return Closure**



Displayed results are relative to the baseline projection

Figure C2: Comparison of Macro Indicators between the Discriminatory, Main/Staus-quo, and Ambitious Scenario under **Rate-of-Return Closure**



Displayed results are the 2032 cumulative percentage change relative to the baseline projection

Table C1: Changes in Intermediate Input Prices by Sector and by Region under **Rate-of-Return Closure**

Region	PRI	MIN	MAN	WHOREP	TPST	INFCOM	PROF	FIN	INS	OTS
Australia and New Zealand*	-0.847	-0.531	-0.501	-0.881	-0.712	-1.119	-0.584	-0.663	-0.837	-0.723
China*	-0.581	-0.606	-0.624	-0.850	-0.903	-0.969	-0.776	-0.672	-0.850	-0.645
Hong Kong, China and Chinese Taipei*	0.103	-0.124	-0.060	-0.230	0.007	-0.223	-0.149	-0.165	0.162	-0.189
Japan*	-0.312	-0.332	-0.304	-0.361	-0.395	-0.364	-0.360	-0.395	-0.387	-0.330
Korea, Republic of*	-0.384	-0.526	-0.562	-0.700	-1.634	-1.154	-0.678	-0.832	-0.971	-0.417
India	-0.104	-0.121	-0.175	-0.124	-0.134	-0.102	-0.093	-0.075	-0.066	-0.119
Other Asian Economy	-0.065	0.027	-0.059	0.122	0.028	0.130	0.096	0.155	0.186	0.074
Indonesia	-0.440	-0.442	-0.425	-0.475	-0.433	-0.468	-0.472	-0.489	-0.490	-0.454
Southeast Asia (SDR Participant)*	-0.217	-0.725	-0.597	-2.449	-2.126	-4.547	-3.161	-4.360	-4.650	-0.559
Southeast Asia (Non-Participant)	-0.290	-0.252	-0.291	-0.250	-0.265	-0.230	-0.232	-0.171	-0.205	-0.243
Asian LDC	-0.298	-0.282	-0.286	-0.271	-0.281	-0.275	-0.282	-0.273	-0.272	-0.275
Canada*	-0.317	-0.461	-0.312	-0.647	-0.443	-0.829	-0.525	-0.931	-1.065	-0.399
United States of America*	-0.131	-0.133	-0.278	-0.126	-0.225	-0.274	-0.120	-0.107	-0.242	-0.191
Mexico*	-0.489	-0.893	-0.432	-1.322	-1.085	-0.842	-0.802	-0.715	-2.704	-0.658
Brazil*	-0.589	-1.535	-0.660	-1.217	-0.864	-1.525	-1.291	-1.839	-1.354	-0.921
Latin America (SDR Participant)*	-0.604	-0.688	-0.626	-0.893	-0.921	-1.379	-0.924	-1.344	-1.759	-0.715
Latin America (Non-Participant)	0.258	0.268	0.163	0.406	0.074	0.400	0.350	0.416	0.363	0.285
European Union 27*	-0.709	-0.834	-0.771	-1.076	-1.031	-1.219	-1.117	-1.524	-1.399	-0.843
United Kingdom*	-1.094	-0.431	-0.566	-0.871	-0.904	-1.277	-0.858	-1.426	-1.028	-0.510
European Free Trade Association*	-0.562	-0.728	-0.607	-0.968	-0.783	-0.882	-0.820	-1.041	-1.172	-0.672
Russian Federation*	-0.476	-0.662	-0.530	-0.861	-0.753	-1.597	-1.221	-1.836	-2.515	-0.658
Middle East and North Africa (SDR Participant)*	-0.298	-0.939	-0.385	-0.676	-1.380	-0.741	-0.676	-1.291	-1.323	-0.403
Middle East and North Africa (Non-Participant)	-0.139	-0.191	-0.188	-0.093	-0.185	-0.100	-0.100	-0.042	-0.060	-0.146
Saudi Arabia, Kingdom of*	-0.652	-1.885	-0.485	-1.260	-0.446	-1.277	-1.855	-2.266	-2.912	-0.833
Türkiye*	-0.316	-1.133	-0.550	-1.599	-0.871	-3.785	-3.188	-2.768	-8.721	-1.025
Other Sub-Saharan Africa Economies (SDR Participant)*	-0.676	-1.622	-0.498	-1.773	-0.864	-3.018	-2.017	-3.696	-1.812	-1.135
Other Sub-Saharan Africa Economies (Non-Participant)	-0.184	-0.162	-0.192	-0.146	-0.231	-0.144	-0.156	-0.149	-0.142	-0.175
Sub-Saharan Africa LDC	-0.188	-0.159	-0.181	-0.156	-0.245	-0.163	-0.159	-0.141	-0.140	-0.191
South Africa	-0.172	-0.137	-0.189	-0.101	-0.161	-0.175	-0.100	-0.092	-0.092	-0.139
Rest of World (SDR Participant)*	-0.478	-0.604	-0.394	-1.109	-0.611	-1.392	-0.764	-0.799	-0.848	-0.438
Rest of World (Non-Participant)	-0.065	0.010	-0.124	0.070	-0.112	0.079	0.113	0.147	0.158	-0.002

Displayed results are the 2032 cumulative percentage change relative to the baseline projection, the results are based on the AVE cost reductions from the benchmark specification

*Indicates regions participating in the SDR outcome