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Beyond Tariffs: The Trade and Welfare Effects of APEC*

Chenxin Jin† Wei Jin‡ Yang Pei§ Bin Sheng¶ Heng Zhang‖

Abstract

We study the trade and welfare effects of APEC in a structural general equilibrium model with heterogeneous firms. Using a generalized Melitz framework, we estimate the direct trade effect of common APEC membership with PPML gravity regressions on bilateral trade data from 1980 to 2020, focusing on Pacific Rim and APEC+ samples to improve comparability. We find that APEC membership has a large and robust positive effect on bilateral trade flows. The effect remains strong after controlling for observed tariffs, indicating that APEC reduces broader trade frictions, including fixed trade costs. We use this estimate to calibrate a no-APEC counterfactual and show that APEC generates sizable ex-post gains in real income, real output, trade, firm entry, and export participation for member economies, while also lowering global income inequality.

Keywords: Asia-Pacific Economic Cooperation; Gravity Equation; Melitz Model; Trade and Welfare Effects

JEL Classification: F13; F14; F15; F17; F53

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1 Introduction

Established in 1989, the Asia Pacific Economic Cooperation (APEC) forum has become one of the central institutions of regional economic cooperation in the Pacific Rim. Bringing together 21 member economies,[1] APEC occupies an important place in the region's trade and integration architecture and remains a prominent platform for cooperation on trade, investment, business facilitation, and broader economic policy coordination. This institutional importance has become even more salient in a period of rising fragmentation in the world economy. Trade and investment relations are increasingly shaped not only by formal trade agreements, but also by geopolitical tensions, regional realignment, and the resilience of production networks. In such an environment, understanding the economic role of large regional forums such as APEC is of first order importance.

APEC enters 2026 at a particularly important institutional juncture. The Bogor Goals were adopted in 1994, translated into an operational framework through the Osaka Action Agenda in 1995, and moved into the implementation phase through the Manila Action Plan in 1996. Thus, 2026 marks thirty years since the implementation phase of the Bogor agenda began (Asia-Pacific Economic Cooperation, 2026b). It also marks twenty years since the FTAAP was advanced as a long-term prospect, renewing attention to practical progress toward region-wide economic integration (Asia-Pacific Economic Cooperation, 2026a). At the same time, the Asia–Pacific faces rising protectionism, anti-globalization pressures, geopolitical conflict, trade wars, and increasingly fragmented supply chains. These conditions create an urgent need for APEC to define a credible post-Bogor agenda and make a rigorous assessment of its past economic effects especially relevant for the design of future cooperation.

Yet APEC poses a particularly interesting puzzle. Unlike formal preferential trade agreements, APEC is voluntary, relatively flexible, and only weakly enforceable. Its economic effects therefore need not operate primarily through statutory tariff reductions alone. Instead, they may also work

[1] The 21 APEC members are: Australia, Brunei Darussalam, Canada, Chile, China, Hong Kong (China), Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, the Philippines, Russia, Singapore, Chinese Taipei, Thailand, the United States, and Viet Nam.

through broader reductions in trade frictions, including lower fixed trade costs, improved information and coordination, and greater trade facilitation. Despite APEC's scale and policy relevance, however, there is still limited ex-post evidence on its realized trade and welfare effects in a structural general equilibrium framework. Existing work has often examined aggregate trade effects in reduced form or evaluated prospective liberalization scenarios, but has paid much less attention to the broader equilibrium consequences of APEC membership itself. Filling this gap is important because a credible future agenda requires evidence on whether APEC has generated meaningful gains and on which institutional channels have been most effective.

APEC's institutional activities illustrate two distinct types of non-tariff trade-cost reduction. The Trade and Industry Department of the Government of the Hong Kong Special Administrative Region identifies customs simplification, electronic commerce, the APEC Business Travel Card, mutual-recognition arrangements for telecommunications and electrical and electronic equipment, and initiatives promoting ease of doing business and good regulatory practices as concrete APEC achievements (Trade and Industry Department, Government of the Hong Kong Special Administrative Region, 2026; APEC Business Mobility Group, 2025). The first group—customs simplification and electronic trade procedures—primarily reduces administrative, documentation, and delay costs incurred whenever goods cross a border. We interpret these measures as reductions in variable trade costs. The second group—the Business Travel Card, mutual recognition of conformity assessment, and greater regulatory transparency—primarily lowers the destination-specific costs of market search, business travel, product certification, learning foreign regulations, and obtaining approvals. We interpret these measures as reductions in fixed foreign-market entry costs. Some initiatives may affect both margins, but this classification identifies their dominant mechanism. Statutory tariffs remain a separate trade-cost channel.

This paper quantifies the trade and welfare effects of APEC in a structural framework with heterogeneous firms. We develop a generalized Melitz model in which bilateral trade is shaped by three distinct channels: variable trade costs, fixed market entry costs, and tariffs. This structure allows APEC membership to affect both the intensive margin and the extensive margin of trade.

Guided by the model implied structure equation, we first estimate reduced form gravity equations with PPML using bilateral trade data over 1980 to 2020. To improve identification, we do not rely only on a global comparison between APEC members and all nonmembers. Instead, we focus on two tighter comparison groups: a Pacific Rim sample and a narrower APEC+ sample consisting of APEC members and economies located close to the same regional integration margin. We then use the estimated direct trade effect of APEC membership to calibrate a structural no-APEC counterfactual and solve the model in hats to quantify its general equilibrium effects on trade, welfare, firm entry, export participation, and global income inequality.

Our empirical analysis is guided by a generalized Melitz-type framework in which APEC membership affects bilateral trade through variable trade costs, fixed export-market entry costs, and tariffs. With heterogeneous firms, monopolistic competition, and endogenous export selection, the model implies that bilateral trade can be expressed in terms of a single composite trade-resistance term that summarizes these three margins in a unified way. This structure links the reduced-form gravity estimates to the structural counterfactual analysis: the estimated direct effect of common APEC membership can be interpreted as a decline in comprehensive bilateral trade frictions rather than as a pure tariff effect. In turn, this mapping allows the empirical estimates to discipline a general equilibrium counterfactual with endogenous firm entry, export participation, and income adjustment.

The data used in the gravity estimation come from several sources. Bilateral trade flows and standard gravity controls are drawn primarily from the CEPII-Gravity database, which offers broad country coverage together with the geographic and historical covariates commonly used in gravity estimation. We construct an annual panel for 1980–2020 and further incorporate tariff information from WITS and production-side information from STAN, OECD input–output tables, and WIOD. The main policy variable is an indicator for common APEC membership, coded according to official accession timing and lagged by one year so that annual treatment better aligns with the effective period of membership.

The empirical specification follows directly from the structural gravity logic of the model.

We estimate bilateral trade equations with PPML, including exporter-year and importer-year fixed effects to absorb country-specific time-varying factors and multilateral resistance, and exporter-importer fixed effects to absorb time-invariant bilateral determinants of trade. Under this design, identification comes from within-pair changes over time in common APEC membership. We estimate the model on two progressively tighter comparison samples—the Pacific Rim sample and the APEC+ sample—to improve comparability between members and non-members. We also augment the specification with tariff controls and estimate year-specific coefficients to distinguish the broader trade effect of APEC from tariff liberalization alone and to trace how that effect evolves over time.

Our empirical results show that APEC has a large and robust positive direct effect on bilateral trade. In the Pacific Rim sample, the baseline coefficient on common APEC membership is stable across specifications and implies sizable increases in bilateral trade. Once tariffs are controlled for and exporter-importer pair fixed effects are included, the estimated APEC coefficient rises further, indicating that APEC's economic role extends well beyond tariff liberalization alone. The same pattern appears in the tighter APEC+ sample. These findings are consistent with the view that APEC reduces a broader set of trade frictions, including the fixed costs associated with entering foreign markets. The dynamic estimates further suggest that the trade effect was especially strong in the early phase of regional integration and later evolved into a persistent, though smaller, maintenance effect.

Building on the reduced-form estimates, we next calibrate the structural model and solve the no-APEC counterfactual using exact changes, following Dekle et al. (2007). The calibration uses observed bilateral trade, expenditure, and output shares, together with tariffs, trade deficits, and a small set of structural parameters. In the benchmark, we set the elasticity of substitution to $\sigma = 5$ (Head and Mayer, 2014). Following Caliendo and Parro (2015), we construct economy-specific value-added shares, β_i, using the median value-added share in gross output across sectors. We also impose $\theta - (\sigma - 1) = 1$, as in Helpman et al. (2004), which implies a Pareto shape parameter of $\theta = 5$. We then map the estimated direct trade effect of common APEC membership into the

model's composite trade-friction term to determine the no-APEC shock applied to member pairs. To assess robustness, we also consider alternative calibrations with $\theta = 8$ and $\theta = 10$ (Helpman et al., 2004; Chaney, 2008; Eaton et al., 2011). This strategy allows the reduced-form estimate to determine the magnitude of the counterfactual shock, while the structural model traces its general-equilibrium implications for trade, welfare, firm entry, and export participation.

We then use the estimated direct trade effect of APEC membership to calibrate a structural no-APEC counterfactual and solve the model in hats to quantify the resulting general equilibrium effects on trade, welfare, firm entry, export participation, and global income inequality. The counterfactual results show that the direct trade effects identified in the data translate into economically meaningful gains once general-equilibrium adjustments are taken into account. Relative to the no-APEC benchmark, member economies experience sizable increases in real income, real output, exports, imports, the mass of entrants, and the share of firms that serve foreign markets. These gains are already visible in the early years of the institution and become larger as membership expands over time, indicating that APEC's benefits accumulate both through deeper integration among incumbent members and through the enlargement of the regional network itself. The broad pattern is also informative about mechanism: because the model features heterogeneous firms and endogenous export selection, the welfare effects do not arise solely from larger bilateral trade volumes, but also from lower prices, improved market access, and stronger extensive-margin responses.

The structural results also suggest that APEC's effects are not confined to average member gains, but extend to the global distribution of income. In the factual world with APEC, global Gini coefficients are generally lower than in the counterfactual world without it, whether inequality is measured using nominal or real income. This finding implies that APEC has tended to raise member-country income without widening global disparities; if anything, the integration gains have modestly compressed cross-country inequality. At the same time, the effects on non-members are typically small and mixed, which is consistent with the interpretation that APEC mainly operates by reducing frictions within the regional network rather than by generating large negative spillovers abroad. Robustness exercises with alternative values of θ deliver the same qualitative

conclusions, although the magnitudes become smaller as θ rises. Taken together, the counterfactual analysis indicates that APEC has functioned not merely as a diplomatic forum, but as an economically consequential regional institution that lowered comprehensive trade frictions, expanded market participation, generated measurable welfare gains, and modestly reduced global income inequality.

This paper is related to three strands of the literature. First, it contributes to the literature on APEC and international trade. Existing studies have shown that APEC membership may increase intra member trade, while earlier quantitative work evaluated liberalization scenarios in highly aggregated environments. Lee (2012) use panel data for APEC and non-APEC economies over 1990–2007 to examine whether APEC membership increases bilateral trade and find that APEC created trade mainly between 2002 and 2007, with stronger effects once advanced and developing members completed tariff reductions. In a dynamic general-equilibrium setting, McKibbin (1996) use the Asia–Pacific G-Cubed model to evaluate the Bogor Declaration and show that non-preferential liberalization yields the largest gains. This strand of work typically focuses on aggregate trade flows and partial-equilibrium or highly aggregated welfare effects by using computable general equilibrium (CGE) models (Chan and Nugent, 1999; Adams et al., 2000; Scollay and Gilbert, 2000) or partial-equilibrium gravity regression (Kurihara, 2003). By contrast, our study embeds APEC in a heterogeneous-firm Melitz framework, decomposes the membership effect into variable trade costs, fixed export-entry costs, and tariff wedges, and solves for the general-equilibrium responses of entry, prices, trade, and welfare. The most closely related paper in this strand is Lee (2012), but unlike that gravity-based study, we incorporate firm heterogeneity and fixed export costs and quantify the full general-equilibrium welfare effects of APEC.

Second, the paper advances the broader quantitative literature on formal and quasi-formal trade arrangements. A large literature has studied the trade and welfare effects of institutions such as NAFTA, the WTO, the RCEP, and broader regional or policy-based integration arrangements. Much of that work focuses on formal agreements with stronger legal commitment or on tariff centered integration. For example, Caliendo and Parro (2015) develop a multi-sector quantita-

tive trade model with heterogeneous firms to evaluate the trade and welfare effects of NAFTA. Caliendo et al. (2021) develop and estimate a dynamic multi-country general-equilibrium model to show that the 2004 EU enlargement generated sizable welfare gains for both incumbent and accession countries. Many studies also verify the GATT/WTO has greatly increased international trade and welfare (Bagwell and Staiger, 1999; Rose, 2004; Ossa, 2011). More recently, Jin et al. (2025) study the dynamic trade and welfare effects of RCEP in a multi-region, multi-sector dynamic general-equilibrium framework and find sizable gains for member economies together with spillover effects for non-members. As we can find, much of this literature focuses on formal agreements and on shallow integration through tariffs, while the literature on quasi-formal agreements is much limited, except for Saia (2017) on the euro and Gao et al. (2024) on the Belt and Road Initiative. Our contribution is to evaluate APEC, a voluntary and largely non-binding forum, in a generalized Melitz framework that accommodates variable trade costs, fixed market-entry costs, and tariff wedges. In doing so, we provide a structural assessment of how APEC-style facilitation and liberalization affect both trade margins and welfare. This study therefore broadens the scope of quantitative trade analysis beyond formal trade agreements and helps clarify how softer institutional arrangements can still generate economically important reductions in comprehensive trade frictions.

Third, the paper speaks to the quantitative literature on heterogeneous firm trade models and the extensive margin. Building on the Melitz framework, Chaney (2008) incorporate firm heterogeneity into gravity equations and show that trade-cost elasticities are dampened rather than magnified because the intensive and extensive margins respond differently to trade frictions. In a more recent quantitative application, Caliendo et al. (2023) construct a global tariff database and evaluate the welfare effects of multilateral tariff reductions in a multi-sector heterogeneous-firm model, showing that selection effects linked to firm entry account for an important share of the gains. Using a generalized Melitz framework, Fernandes et al. (2023) show that the extensive margin explains a large share of the variation in bilateral trade flows and that allowing for richer firm heterogeneity changes the implied trade responses even when welfare implications remain similar.

Relatedly, Feenstra and Ma (2014) show that trade facilitation improves export variety through the extensive margin, while higher tariffs reduce it.

Building on this literature, our paper applies a generalized Melitz framework to APEC and decomposes the effects of membership into changes in variable trade costs, fixed export-entry costs, and tariffs. This structure allows us to connect reduced-form gravity estimates of APEC membership to structural mechanisms and to trace how APEC affects firm entry, export participation, trade flows, and welfare in general equilibrium. The most closely related paper in this strand is Caliendo et al. (2023). Unlike their analysis of multilateral tariff reductions, however, we study a voluntary regional arrangement and emphasize that its effects need not operate primarily through tariffs alone. In our framework, APEC reduces not only variable trade costs but also fixed market-entry costs, thereby changing the set of firms that can profitably serve foreign markets. This mechanism is central to both the empirical and counterfactual analysis, because it explains why the estimated APEC effect remains large even after tariff controls are introduced and provides the bridge from reduced-form gravity estimates to general-equilibrium welfare calculations. In this way, the paper links the literature on structural gravity and regional integration to the literature emphasizing firm selection, export participation, and extensive-margin adjustment.

The rest of the paper is organized as follows. Section 2 presents the generalized Melitz framework, describes the empirical design and data construction, and reports the baseline evidence on the direct trade effects of APEC. Section 3 then develops the counterfactual framework and discusses the ex-post general equilibrium effects of APEC on welfare, trade, and global income inequality. Section 4 concludes. Additional equilibrium conditions, the numerical algorithm, and robustness results are reported in the Appendix.

2 Empirical Analysis

2.1 Theoretical Framework

We build a generalized Melitz-type framework to quantify how APEC affects trade and welfare through three distinct channels: variable trade costs, fixed market-entry costs, and tariffs. The model features heterogeneous firms, monopolistic competition, trade in intermediates, and a non-truncated Pareto distribution of productivity draws. This combination allows bilateral trade flows to respond along both the intensive margin and the extensive margin.

Motivated by the institutional examples above, we interpret reductions in τ_{ij} as the effects of measures such as customs simplification and electronic trade procedures, which lower shipment-level costs. Reductions in f_{ij} capture measures such as the APEC Business Travel Card, mutual recognition of product testing and certification, and regulatory cooperation, which lower the up-front cost of entering and serving a foreign market. Changes in statutory tariffs are represented separately by t_{ij}.

Consider a world with multiple countries indexed by i and j. Each country i is endowed with a fixed labor supply L_i. Consumers have Constant Elasticity of Substitution (CES) preferences over a continuum of differentiated varieties, with elasticity of substitution $\sigma > 1$. On the production side, firms in country i use an input bundle with unit cost c_i, and the mass of entrants is denoted by N_i. To enter, each firm must pay a sunk entry cost $c_i F_i$ and then draws productivity $1/a$ from a Pareto distribution. Specifically, the cost draw a follows

$$G_i(a) \equiv \left(\frac{a}{\overline{a}_i}\right)^{\theta}, \qquad a \in [0, \overline{a}_i], \qquad \theta > \sigma - 1. \tag{1}$$

The parameter θ governs the dispersion of firm heterogeneity. A larger θ implies less dispersion and therefore a thinner upper tail of highly productive firms.

To serve destination j, a firm from country i must incur a fixed export cost $c_i f_{ij}$, pay iceberg trade costs $\tau_{ij} > 1$, and face the ad-valorem tariff t_{ij} imposed by the importing country. Under CES

demand and monopolistic competition, only sufficiently productive firms can profitably export. Let a_{ij} denote the cutoff cost draw for exporters from i to j. Firms with $a \leq a_{ij}$ serve market j, whereas firms with $a > a_{ij}$ do not. The zero-profit cutoff condition is

$$\frac{1}{\sigma}\frac{1}{1+t_{ij}}\left(\frac{\sigma}{\sigma-1}\frac{c_i\tau_{ij}(1+t_{ij})a_{ij}}{P_j}\right)^{1-\sigma}E_j = c_i f_{ij}, \tag{2}$$

where P_j is the CES price index and E_j is total nominal expenditure in country j. Equation (2) makes the selection mechanism transparent: higher variable trade costs, higher tariffs, or higher fixed export costs all tighten the export cutoff and reduce participation in foreign markets, given remaining economic factors unchanged.

Aggregating over active firms yields the expenditure of country j on varieties produced in country i, i.e., bilateral tariff-inclusive trade flow:

$$X_{ij} = \left(\frac{\sigma}{\sigma-1}\frac{c_i\tau_{ij}(1+t_{ij})}{P_j}\right)^{1-\sigma}E_j N_i V_{ij}, \tag{3}$$

and the CES price index satisfies

$$P_j^{1-\sigma} = \sum_i \left(\frac{\sigma}{\sigma-1}c_i\tau_{ij}(1+t_{ij})\right)^{1-\sigma}N_i V_{ij}. \tag{4}$$

The term V_{ij} summarizes the extensive margin. It measures the share of firms from i that export to j, weighted by their market shares:

$$V_{ij} \equiv \int_0^{a_{ij}} a^{1-\sigma}dG(a) = \frac{\theta}{\theta-\sigma+1}\frac{a_{ij}^{\theta-\sigma+1}}{\bar{a}_i^{\theta}}. \tag{5}$$

Thus, international trade depends not only on variable trade frictions, but also on the mass of entrants and the proportion of firms that can profitably enter each destination market. The tariff-

inclusive expenditure flow X_{ij} implies the tariff-exclusive import value

$$M_{ij} = \frac{X_{ij}}{1+t_{ij}}. \tag{6}$$

Let Y_i denote total sales by country i across all destinations. Imposing goods-market clearing gives

$$Y_i = \sum_j M_{ij} = \left(\frac{\sigma}{\sigma-1}c_i\right)^{1-\sigma} N_i \sum_j \left(\frac{\tau_{ij}}{P_j}\right)^{1-\sigma} E_j V_{ij}(1+t_{ij})^{-\sigma}. \tag{7}$$

With Equation (7), eliminating the common term $\left(\frac{\sigma}{\sigma-1}c_i\right)^{1-\sigma} N_i$ from bilateral trade flows and price indices, yields a modified structural gravity equation:

$$M_{ij} = \frac{Y_i E_j}{Y_w}\left(\frac{\tau_{ij}}{\Pi_i P_j}\right)^{1-\sigma} V_{ij}(1+t_{ij})^{-\sigma}, \tag{8}$$

where $Y_w \equiv \sum_i Y_i$ is the world output, and Π_i and P_j are outward and inward multilateral resistance terms (Anderson and van Wincoop, 2003; Anderson and Yotov, 2010). Specifically,

$$\Pi_i^{1-\sigma} \equiv \sum_j \left(\frac{\tau_{ij}}{P_j}\right)^{1-\sigma} V_{ij} e_j (1+t_{ij})^{-\sigma}, \tag{9}$$

$$P_j^{1-\sigma} = \sum_i \left(\frac{\tau_{ij}}{\Pi_i}\right)^{1-\sigma} V_{ij} s_i (1+t_{ij})^{1-\sigma}, \tag{10}$$

with expenditure share of country j and output share of country i, respectively denoted as

$$e_j \equiv \frac{E_j}{Y_w}, \qquad s_i \equiv \frac{Y_i}{Y_w}.$$

Relative to the structural gravity framework of Anderson and van Wincoop (2003), Equations (8)–(10) include an additional term, V_{ij}, that captures firm selection and the extensive margin, and they explicitly incorporate tariff wedges.

The key advantage of this setup is that it allows us to rewrite trade flows in terms of observable or economically interpretable bilateral frictions. Combining the cutoff condition in (2) with the

definition of V_{ij} in (5) yields

$$\tau_{ij}^{1-\sigma} V_{ij}(1+t_{ij})^{-\sigma} = \tau_{ij}^{-\theta} f_{ij}^{-\frac{\theta}{\sigma-1}+1}(1+t_{ij})^{-\frac{\sigma\theta}{\sigma-1}} P_j^{\theta-\sigma+1} c_i^{-\frac{\sigma\theta}{\sigma-1}+\sigma} E_j^{\frac{\theta}{\sigma-1}-1} \times \text{constant}, \tag{11}$$

where

$$\text{constant} = \frac{\theta}{\theta-\sigma+1}\frac{1}{\overline{a}_i^{\theta}}\sigma^{\frac{\theta-\sigma+1}{1-\sigma}}\left(\frac{\sigma-1}{\sigma}\right)^{\theta-\sigma+1}.$$

Equation (11) shows that the bilateral trade term can be decomposed into variable trade costs τ_{ij}, fixed market-entry costs f_{ij}, and tariffs t_{ij}. This decomposition is crucial for the empirical analysis because it links the reduced-form partial trade impacts of APEC membership to structurally meaningful channels.

Substituting (11) into aforementioned gravity system yields a modified gravity:

$$M_{ij} = \frac{Y_i E_j}{Y_w}\left(\frac{\tau_{ij}^{-\theta} f_{ij}^{-\frac{\theta}{\sigma-1}+1}(1+t_{ij})^{-\frac{\sigma\theta}{\sigma-1}}}{\chi_i \zeta_j}\right), \tag{12}$$

where

$$\chi_i \equiv \sum_j \frac{\tau_{ij}^{-\theta} f_{ij}^{-\frac{\theta}{\sigma-1}+1}(1+t_{ij})^{-\frac{\sigma\theta}{\sigma-1}}}{\zeta_j} e_j, \tag{13}$$

$$\zeta_j = \sum_i \frac{\tau_{ij}^{-\theta} f_{ij}^{-\frac{\theta}{\sigma-1}+1}(1+t_{ij})^{1-\frac{\sigma\theta}{\sigma-1}}}{\chi_i} s_i. \tag{14}$$

We interpret χ_i as the market access potential of exporter i which summarizes how easily country i can reach global demand once destination size is taken into account. Likewise, ζ_j measures the sourcing potential of importer j that summarizes how easily country j can source from the world economy after weighting by source-country supply capacity (Chang et al., 2022, 2026).

The remaining equilibrium conditions close the model through nominal income, total expenditure, external balance, and factor-market clearing. Country i's nominal income consists of labor

income, the exogenous trade deficit, and tariff revenue:

$$I_i \equiv w_i L_i + D_i + T_i, \qquad T_i = \sum_j M_{ji} t_{ji}. \tag{15}$$

Thus, tariff revenue is collected from imports and transferred to households in a lump-sum fashion. The nominal income, in turn, finances both final demand and the intermediate-input demand generated by domestic production.

Total expenditure in country i equals nominal income plus intermediate demand. Using $X_i \equiv E_i$ and $M_{ij} = X_{ij}/(1+t_{ij})$, we obtain

$$X_i \equiv E_i = I_i + (1-\beta_i)\sum_j M_{ij} = w_i L_i + D_i + T_i + (1-\beta_i)\sum_j \frac{X_{ij}}{1+t_{ij}}. \tag{16}$$

Equation (16) makes clear that expenditure has two components: household income and the demand for intermediate goods used in production. Because intermediates are sourced from the same CES aggregate as final goods, the production side feeds back directly into aggregate expenditure.

The model also requires consistency between imports, exports, and the exogenous deficit. This implies the external-balance condition

$$\sum_j \frac{X_{ji}}{1+t_{ji}} = \sum_j \frac{X_{ij}}{1+t_{ij}} + D_i, \qquad \sum_j M_{ji} = \sum_j M_{ij} + D_i. \tag{17}$$

Equation (17) states that tariff-exclusive import expenditure must equal tariff-exclusive export revenue plus the trade deficit. This condition links bilateral trade flows to macroeconomic closure and ensures that the model remains consistent with observed imbalances.

Finally, labor-market clearing implies that labor income equals labor's share in gross production:

$$w_i L_i = \beta_i \sum_j \frac{X_{ij}}{1+t_{ij}} = \beta_i \left(1 - \frac{\sigma-1}{\sigma\theta} + \frac{\sigma-1}{\sigma\theta}\right) Y_i = \beta_i Y_i. \tag{18}$$

The first equality expresses labor payments as a share of tariff-exclusive sales, while the second uses the decomposition of revenue between variable production and firm entry. Hence labor income

is pinned down by aggregate sales, which closes the factor market on the supply side.

To complete the equilibrium system, the input-bundle cost and the free-entry condition imply

$$c_i = w_i^{\beta_i} P_i^{1-\beta_i}, \tag{19}$$

and

$$\beta_i \frac{\sigma - 1}{\sigma \theta} Y_i = N_i F_i c_i. \tag{20}$$

Equation (19) links marginal cost to wages and intermediate prices, while Equation (20) determines the mass of entrants from the free-entry condition. Together, Equations (2)–(20) characterize the equilibrium of the model. Most importantly for the empirical analysis below, the system nests tariffs, variable trade costs, and fixed export costs in a unified structure, so that the estimated partial (direct) effects of APEC membership can be mapped into changes in comprehensive trade frictions and then into general equilibrium welfare.

2.2 Empirical Design

The empirical specification maps the theoretical gravity system into an estimable reduced form. In the model, bilateral trade is governed by the composite friction term

$$\Lambda_{ij} \equiv \tau_{ij}^{-\theta} f_{ij}^{-\frac{\theta}{\sigma-1}+1} (1+t_{ij})^{-\frac{\sigma\theta}{\sigma-1}}, \tag{21}$$

which combines variable trade costs, fixed export-entry costs, and tariffs in a single object. This decomposition is central to the empirical strategy. It allows the reduced-form APEC coefficient to be interpreted not as a tariff effect but as the net effect of membership on the broader trade-resistance term that governs both the intensive and extensive margins in the generalized Melitz framework.

Let X_{ijt} denote bilateral trade flow from country i to country j in year t. The key policy regressor is $bothAPEC_{ijt}$, a dummy equal to one if both economies are APEC members in year t.

We estimate the gravity regression by utilizing the Poisson Pseudo Maximum Likelihood (PPML) estimator (Silva and Tenreyro, 2006):

$$X_{ijt} = \exp\left[\gamma_1 bothAPEC_{ijt} + \gamma^\top \mathbf{Z}_{ijt} + \delta_{it} + \delta_{jt} + \delta_{ij}\right] + \varepsilon_{ijt}, \tag{22}$$

where $\mathbf{Z}_{ijt}$ is a vector of observable bilateral and time-varying trade-cost proxies, δ_{it} denotes exporter-time fixed effects, δ_{jt} denotes importer-time fixed effects, δ_{ij} denotes exporter-importer fixed effects, and ε_{ijt} is the unobservable error term. The PPML estimator is widely used in the gravity litearature as it can deal with the presence of zero trade flows and the heteroskedasticity in a unified and natural way (Head and Mayer, 2014; Chen et al., 2025). In the empirical implementation, the control vector includes trade cost proxies that are typically used in the gravity literature, trade policy such as tariffs, and political-economy variables that may affect bilateral trade costs.

This specification follows directly from the gravity structure of the Melitz (2003) model. The exporter-time and importer-time fixed effects absorb all country-specific time-varying terms, including output, expenditure, and the multilateral resistance terms implied by the theoretical system (Anderson and van Wincoop, 2003; Head and Mayer, 2014). The exporter-importer fixed effects, δ_{ij}, capture a list of geographic, historical, or cultural bilateral factors that may affect international trade flows for a given country pair (Baier and Bergstrand, 2007). After these fixed effects are partialled out, the identifying variation comes from the bilateral component of common APEC membership across time. In a homogeneous-firm gravity model of Krugman (1980), an exchange model of Anderson and van Wincoop (2003), or a Ricardian model of Eaton and Kortum (2002), the estimated bilateral coefficient would mainly reflect reductions in variable trade costs. In the present framework, however, it captures a broader decline in the composite friction term because fixed export costs also enter the model and affect market participation through the extensive margin.

A key design choice concerns the estimation sample. Because APEC is a regional forum centered on the Asia-Pacific, we do not rely solely on a broad global comparison. Instead, we use

two progressively narrower samples. The first is the Pacific Rim sample, which serves as our main benchmark.[2] The second is the "APEC+" sample, which supplements the 21 APEC members with selected regional comparator economies.[3] These sample restrictions are important for identification. In a global sample, differences between members and non-members may reflect structural factors unrelated to APEC. Restricting the comparison group improves comparability and makes the estimated membership coefficient more credible and easier to interpret. In the baseline specification, we estimate a homogeneous effect of common APEC membership. As a further exercise, we also estimate year-specific APEC coefficients to trace the evolution of the direct trade effect from the early 1990s through 2020.

As discussed above, APEC does not mandate formal tariff reductions. To isolate the non-tariff effect of APEC membership, we alternatively estimate PPML using tariff-adjusted trade flows. Conditional on the parameters σ and θ, the specification is

$$X_{ijt}/(1+t_{ijt})^{-\frac{\sigma\theta}{\sigma-1}} = \exp\left[\gamma_1 bothAPEC_{ijt} + \gamma^\top \mathbf{Z}_{ijt} + \delta_{it} + \delta_{jt} + \delta_{ij}\right] + \varepsilon_{ijt}. \tag{23}$$

Under this specification, the coefficient γ_1 can be interpreted directly as the trade-promoting effect of APEC membership through reductions in non-tariff barriers, net of tariff effects.

[2]The Pacific Rim is a geopolitical and geoeconomic term that collectively refers to the regions surrounding the Pacific Ocean. It commonly includes East Asia, including Russia, Japan, North Korea, South Korea, China, Hong Kong (China), Macao (China), and Chinese Taipei; Southeast Asia, including Viet Nam, Malaysia, Singapore, Indonesia, and the Philippines; Oceania, including sovereign states such as Australia, Palau, the Federated States of Micronesia, Papua New Guinea, the Solomon Islands, Nauru, the Marshall Islands, Vanuatu, New Zealand, Tuvalu, Fiji, Kiribati, Tonga, and Samoa, as well as dependencies and territories such as Norfolk Island, Christmas Island, the Cocos (Keeling) Islands, Tokelau, Niue, the Cook Islands, New Caledonia, Wallis and Futuna, French Polynesia, the Pitcairn Islands, the Northern Mariana Islands, Guam, American Samoa, and Easter Island; North America, including Canada, the United States, and Mexico; Central America, including Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama; and South America, including Colombia, Ecuador, Peru, and Chile.

[3]The additional comparator economies are India, Bangladesh, Pakistan, Sri Lanka, Macao (China), Mongolia, Laos, Cambodia, Costa Rica, Colombia, Panama, and Ecuador. The APEC+ sample is constructed solely for empirical comparability and does not represent an official APEC membership-enlargement agenda.

2.3 Data Description

The empirical analysis combines bilateral trade, policy, geography, and input–output information into a single panel designed for both reduced-form estimation and structural counterfactual analysis. The starting point is the CEPII-Gravity database, which provides the broad country coverage and the core bilateral covariates used in gravity estimation. The resulting dataset spans 243 countries and regions over 1980–2020. Within that universe, 21 economies are coded as APEC members and the remaining economies form the non-APEC control group. This broad coverage is useful for constructing the baseline panel, while the estimation itself later focuses on tighter comparison samples in order to reduce excessive heterogeneity across countries.

The bilateral trade-flow measure is sourced from the trade series embedded in CEPII-Gravity. Because CEPII-Gravity incorporates flows from UN Comtrade, CEPII-BACI, and IMF DOTS, the first task is to choose a single series that is both long enough and internally consistent. The paper uses importer-reported UN Comtrade values for 1980–2020. This choice is deliberate. CEPII-BACI provides harmonized bilateral flows, but its coverage begins only in 1996 and is therefore too short for the full historical analysis. Importer-reported Comtrade data also have a natural interpretation in the present context because tariffs are imposed by the destination economy and because the structural mapping later distinguishes tariff-inclusive expenditure from tariff-exclusive imports.

Most of the standard bilateral controls are drawn directly from CEPII-Gravity and related CEPII sources. These include bilateral distance ($\ln Dist_{ij}$), contiguity ($Contig_{ij}$), common language ($ComLang_{ij}$), common colonial history ($ComCol_{ij}$), legal-origin indicators ($ComLegPre_{ij}$ and $ComLegPost_{ij}$), sibling-state status ($Sibling_{ij}$), and hegemony indicators ($HegO_{ij}$ and $HegD_{ij}$). The diplomatic-disagreement index ($DiploDisag_{ijt}$) is also taken from the gravity data infrastructure and is ultimately based on the UN voting-based measure developed by Bailey et al. (2017). The distance variable is the log of population-weighted bilateral distance, following the construction used by Mayer and Zignago (2011). Together, these controls proxy for observable bilateral resistance and help separate the APEC effect from other persistent determinants of trade.

Several variables are added or refined beyond what CEPII-Gravity alone provides. The regional trade agreement indicator (RTA_{ijt}) is constructed from the Baier–Bergstrand EIA database and supplemented with WTO RTA information where needed. The GSP indicator (GSP_{ijt}) is compiled from the EIA database, WTO PTA information, UN trade and development sources, and CEPII-Gravity. The value-added share, which later enters the structural counterfactual system as the Cobb–Douglas labor share parameter, is assembled from the STAN database, the OECD input–output tables, and WIOD. When country coverage is incomplete, the WIOD 2016 "Rest of World" series is used to fill missing observations. This step is important because the counterfactual exercise requires a complete panel of expenditure shares and production-side parameters.

The main policy variable is $bothAPEC_{ijt}$, an indicator equal to one when both countries in a bilateral pair are APEC members in year t. Its construction follows official accession timing, but with some adjustment. Since most APEC accessions occur in November, coding membership in the accession year would overstate the effective treatment window for annual data. The paper therefore lags accession by one year and turns the membership indicator on only from the following year onward. Thus, for example, Australia enters as an APEC economy only for $t > 1989$, China, Hong Kong (China), and Chinese Taipei enter for $t > 1991$, Mexico and Papua New Guinea for $t > 1993$, Chile for $t > 1994$, Peru and Russia for $t > 1998$, and Viet Nam for $t > 1999$. This timing convention makes the annual treatment indicator more consistent with the institutional calendar.

Next, tariff variables are introduced to isolate the comprehensive trade effect of APEC from the narrower effect of tariff reductions alone. Tariff data are taken from WITS, specifically from the UNCTAD TRAINS and WTO IDB sources. Because these tariff series begin in 1988, the empirical analysis proceeds in two layers. The paper first estimates specifications without tariffs on the longer 1980–2020 panel and then re-estimates the model with tariffs on the shorter tariff-available sample. Missing tariff observations are handled systematically. Raw TRAINS and WTO-IDB series are first retained; then WITS-based forward or backward fills are used according to the source-specific filling rules described in the paper. For TRAINS, the first fill uses the previous year's tariff and the second uses the following year's tariff. For WTO IDB, the missing value is

replaced by the nearest available year. The final tariff variable uses the raw observation whenever it exists and otherwise follows this ordered replacement rule.

The paper considers three types of tariff measures: the simple average, the weighted average, and the tariff line average. To align the tariff data with the structural model and stabilize the regression scale, each is transformed as $\ln(1+\text{Tariff}_{ijt})$. This produces three parallel tariff controls that are used in the robustness exercises. The three raw tariff measures have means between 5.83 and 7.12 (in percentage point), while the corresponding log tariffs have means between 1.42 and 1.70. Using all three is useful because it shows that the estimated APEC effect does not depend on any single way of aggregating product-level tariff information.

The final panel is used in two nested estimation samples. The first is a Pacific Rim sample, which serves as the main benchmark. The second is an "APEC+" sample that adds selected regional comparator economies to the APEC members. This sample design is part of identification rather than an afterthought and should not be interpreted as a proposed enlargement scenario. A global sample is valuable for data construction, but it can make the membership coefficient reflect structural differences between distant economies rather than the effect of APEC itself. The tighter regional samples therefore provide a more credible comparison group for estimating the direct trade effects of common APEC membership.

2.4 Empirical Results

The empirical results are organized in five steps. Table 1 reports the baseline gravity estimates. Table 2 adds tariff controls for the Pacific Rim sample, and Table 3 repeats this exercise for the narrower APEC+ sample. Tables 4 and 5 use tariff-adjusted trade flows as the dependent variable for the Pacific Rim and APEC+ samples, respectively. Finally, Table 6 traces the year-specific APEC effects from 1991 to 2020. Taken together, the results deliver a consistent message: APEC has a large positive direct effect on bilateral trade; this finding is robust to alternative treatments of tariffs, narrower comparison samples, and more stringent fixed effects; and the effect remains economically meaningful after the initial phase of regional integration.

Although a global sample is useful for data construction, it is less suitable for identifying APEC's direct trade effect. The key issue is comparability rather than sample size. Because APEC is an Asia–Pacific regional cooperation forum, its effect is more credibly identified by comparing members and non-members within the region than by comparing members with all non-members worldwide. Our baseline analysis therefore focuses on the Pacific Rim and, more narrowly, on the APEC+ sample. These restrictions reduce cross-country heterogeneity and make the coefficient on common APEC membership more plausibly interpretable as the effect of participation in the same regional integration arrangement rather than as a proxy for broader structural differences.

Baseline Gravity Results. For the Pacific Rim sample, the baseline results in Table 1 show that the coefficient on $bothAPEC_{ijt}$ is 0.528 in column (1), 0.531 in column (2), 0.520 in column (3), and 0.529 in column (4). All four estimates are economically meaningful and statistically significant. They imply increases in bilateral trade of approximately 69.6%, 70.1%, 68.2%, and 69.7%, respectively, calculated as $[\exp(\gamma_1) - 1] \times 100\%$. These magnitudes are broadly consistent with estimates of free trade agreement effects reported in the literature (Baier and Bergstrand, 2007; Baier et al., 2019). The salient result is not simply that the estimates vary little across columns, but that the APEC coefficient remains positive, economically large, and statistically significant under alternative sets of controls and more stringent fixed-effect structures. This stability indicates that the finding is not driven by any single specification choice.

The control variables in the baseline table generally exhibit plausible patterns. Distance enters with a negative and statistically significant coefficient, whereas contiguity and common colonial ties enter positively. These signs are consistent with the standard gravity framework. Some other coefficients are less conventional. In particular, the GSP coefficient is negative in most specifications, while the coefficient on diplomatic disagreement is positive. These estimates should be interpreted cautiously, but they do not weaken the main result. The GSP coefficient may, for example, capture trade diversion or the relatively low import dependence of preference-granting developed economies on beneficiary countries. Similarly, diplomatic disagreement measured in a UN-based

political space need not translate directly into bilateral commercial hostility. The key point for our analysis is that the APEC coefficient remains stable after these controls are introduced.

Columns (3) and (4) tighten the design further by including exporter-importer pair fixed effects. These fixed effects absorb time-invariant bilateral frictions, including persistent geographic, historical, and cultural ties (Baier and Bergstrand, 2007). The coefficient on $bothAPEC_{ijt}$ declines only slightly relative to the less restrictive specifications and remains statistically significant. If the APEC estimate merely reflected historically close bilateral relationships, it would be expected to fall sharply after pair fixed effects were added. It does not. The remaining coefficient therefore points to a time-varying membership effect rather than a spurious correlation with fixed bilateral affinity.

The APEC+ results reinforce this conclusion. In columns (5) and (6), the coefficient on $bothAPEC_{ijt}$ rises to 0.568 and 0.577, corresponding to trade increases of approximately 76.5% and 78.1%. This comparison is informative because the APEC+ sample compares members with economies that are much closer to the same regional integration margin, rather than with distant economies outside the region. The larger coefficient therefore suggests that APEC membership generates trade gains beyond the broader expansion of trade in the Asia–Pacific region.

Tariff controls sharpen the interpretation of the APEC effect. In the baseline regressions, the estimated membership coefficient captures APEC's overall reduced-form effect on bilateral trade, combining tariff changes with other dimensions of integration. The tariff specifications ask a more demanding question: how much of the APEC effect remains after observed tariff variation is held fixed? In the present Melitz framework, the remaining coefficient captures broader trade-facilitation channels and reductions in fixed export costs rather than merely changes in statutory tariffs.

Pacific Rim Results with Tariff Controls. Columns (1)–(3) of Table 2 add three alternative tariff measures to the Pacific Rim specification. The resulting APEC coefficients are 0.525, 0.548, and 0.523, all of which are close to the baseline estimates without tariff controls. This comparison

shows that directly controlling for tariffs does not overturn the baseline result. However, these columns do not include pair fixed effects. Columns (4)–(6) therefore provide the more demanding comparison.

Once exporter-importer pair fixed effects are added, the APEC coefficient rises sharply. In columns (4)–(6), the coefficients on $bothAPEC_{ijt}$ are 0.869, 0.862, and 0.870, corresponding to trade increases of approximately 138.5%, 136.8%, and 138.7%. This is the paper's central reduced-form result. These specifications control for a rich set of trade-cost determinants and include the most stringent combination of country-time and pair fixed effects. The remaining APEC coefficient is therefore identified from within-pair changes in common membership after observed tariffs and time-varying country factors have been absorbed. We later use the benchmark estimate of 0.869 to calibrate the comprehensive trade-cost shock in the "No-APEC" exercise.

The tariff coefficients themselves are not particularly stable across measures, and several are statistically insignificant. This pattern is not central to our analysis because these regressions are not intended to identify a precise tariff elasticity. Instead, tariffs serve as additional controls that help distinguish tariff liberalization from the broader institutional, informational, and regulatory channels associated with APEC. After accounting for tariffs, the APEC coefficient remains large, consistent with the view that APEC reduces a broader set of trade frictions than tariff schedules alone can capture.

Column (7) provides an additional robustness check by returning to a specification without tariff controls while restricting the sample to the tariff-available period, 1988–2020. The estimated coefficient remains positive and statistically significant at 0.605. This result shows that the larger coefficients in columns (4)–(6) are not driven solely by shortening the sample to the years for which tariff data are available. Taken together, the tariff-controlled and restricted-period specifications indicate that the positive APEC effect is robust, although its magnitude depends on how comprehensively bilateral frictions are controlled.

APEC+ Results with Tariff Controls. The APEC+ results in Table 3 tell the same story in a narrower sample. In columns (1)–(3), the APEC coefficients are 0.479, 0.503, and 0.479. After pair fixed effects are added in columns (4)–(6), the estimates rise to 0.876, 0.869, and 0.877, implying trade increases of approximately 140.1%, 138.5%, and 140.4%, respectively. The similarity between the Pacific Rim and APEC+ estimates is important because it shows that the large tariff-conditioned APEC effect is not driven by a particular definition of the comparison group. Instead, it is a stable empirical pattern across samples that differ in breadth but share the same regional focus.

This pattern has a direct structural interpretation. In a homogeneous-firm gravity model, a residual APEC coefficient after tariff controls would primarily reflect unobserved reductions in variable trade costs. In the generalized Melitz framework used here, that interpretation is too narrow. The APEC coefficient may also reflect lower fixed export costs, easier market entry, and an increase in the number of firms that can profitably serve foreign destinations. It therefore contains information about both the intensive and extensive margins of trade. For this reason, the tariff-conditioned estimates provide a natural bridge to the counterfactual analysis.

Results with Tariff-Adjusted Trade Flows. The preceding regressions use the conventional gravity specification in Equation (22), with observed tariffs included as right-hand-side controls. As an alternative, we estimate Equation (23) using tariff-adjusted trade flows as the dependent variable, conditional on the parameter values of σ and θ. Tables 4 and 5 report the results for the Pacific Rim and APEC+ samples, respectively.

The estimated APEC membership coefficients remain qualitatively and quantitatively similar when the dependent variable is changed from unadjusted to tariff-adjusted trade flows. For example, columns (4)–(6) of Table 4 report APEC coefficients of 0.919, 0.703, and 0.912 for the simple-average, trade-weighted-average, and line-average tariff measures, respectively, with exporter-importer fixed effects included. These estimates are in the same broad range as the corresponding coefficients of 0.869, 0.862, and 0.870 in Table 2, where unadjusted trade flows are the

dependent variable and tariffs enter as controls. This broad consistency holds in both the Pacific Rim and APEC+ samples, with and without exporter-importer fixed effects, and across the three tariff measures.

Dynamic Estimates. The dynamic estimates provide a final piece of evidence by showing how the direct trade effect evolved over time. This exercise asks whether APEC's trade effect was a one-time historical episode or a persistent feature of the regional trading system. We estimate year-specific PPML regressions for the Pacific Rim sample, retain country-time fixed effects, and allow the APEC coefficient to vary by year. Because tariff data are too sparse in 1990 to support the PPML specification, the dynamic series begins in 1991. Figure 1 and Table 6 report the resulting estimates for the three tariff measures.

The time pattern is striking. In 1991, the coefficients are 1.776 for the simple-average tariff measure, 1.671 for the trade-weighted-average measure, and 1.787 for the line-average measure. These estimates imply bilateral trade increases of approximately 490.6%, 431.7%, and 497.2%, respectively. The estimates remain large through the mid-1990s, stay positive throughout the late 1990s, and decline gradually after 2000. This decline does not imply that the effect disappears. After 2000, the estimates stabilize at levels below their early peaks but remain economically meaningful. Many later coefficients are statistically significant, and almost all are positive.

This dynamic pattern is consistent with APEC's institutional history. The early phase corresponds to a period of rapid regional integration in which tariff liberalization, trade facilitation, and lower entry barriers moved together and activated the extensive margin. A Melitz-type model predicts particularly large trade responses in such an environment. Once firms and trade flows have adjusted along these margins, subsequent gains should become smaller. The mature phase therefore resembles the maintenance of a relatively low-friction regional trading environment rather than a period of rapid liberalization.

The same pattern helps explain why the average APEC coefficient remains large in the pooled regressions even though the annual effects are less pronounced after the early 1990s. The pooled

estimates combine a front-loaded period of very large gains with a later period of smaller but persistent gains. This interpretation is consistent with Figure 1, in which the three annual coefficient series fall sharply from their initial peaks and then fluctuate within a relatively stable range after 2000. The implication is not that APEC has become irrelevant, but that it has moved from a phase of barrier reduction to one of institutional maintenance.

This distinction is important for interpreting the results. In its early years, APEC appears to have generated large trade gains by reducing frictions sufficiently to induce substantial exporter entry. In later years, its contribution is better understood as preserving openness in a region where other agreements, including RCEP and CPTPP, also shape trade incentives (Jin et al., 2025). We therefore interpret the post-2000 flattening not as evidence of APEC's failure, but as an indication that the organization continues to matter within an increasingly crowded regional architecture. From this perspective, further integration through the FTAAP could generate additional gains even though many of the easiest gains from early coordination have already been realized.

3 Quantitative Analysis

3.1 Counterfactual Framework

Given the estimates of the direct effects of APEC membership on trade flows through variable trade costs, fixed market-entry costs, and tariffs, we can quantify how the change in trade barriers due to APEC affects endogenous variables in the economy once general-equilibrium adjustments are taken into account. To proceed, we rewrite the system of structural equations in terms of changes à la the hat algebra of Dekle et al. (2007).

In particular, let x' denote the counterfactual value of a variable x and define $\widehat{x} \equiv \frac{x'}{x}$ as the ratio of the counterfactual to the factual value of the variable. Dividing both sides of the market-clearing condition, Equation (7), by world GDP Y_w, and noting that total sales Y_i equal the total mass of entrants times average cost in the Melitz framework $\left(Y_i = N_i c_i^{1-\sigma} \Pi_i^{1-\sigma} \times \text{constant}\right)$, the

equilibrium implies the following relationship for the change in gross sales:

$$\widehat{s_i} = \widehat{N}_i \widehat{c}_i^{1-\sigma} \widehat{\Pi}_i^{1-\sigma}. \tag{24}$$

where $\widehat{\Pi}_i$ is the change in the outward multilateral resistance term. The multilateral-resistance structural relationship, Equation (9), and the ideal price index, Equation (10), imply that

$$\widehat{\Pi}_i^{1-\sigma} = \sum_j \pi_{ij} \widehat{\Lambda}_{ij} \widehat{P}_j^{\sigma-1} \widehat{e}_j, \tag{25}$$

$$\widehat{P}_j^{1-\sigma} = \sum_i \lambda_{ij} \widehat{\Lambda}_{ij} \widehat{\Pi}_i^{\sigma-1} \widehat{s_i} \widehat{(1+t_{ij})}. \tag{26}$$

where $\pi_{ij} \equiv M_{ij}/Y_i$ is the share of country i's sales that goes to destination j, and $\lambda_{ij} \equiv X_{ij}/E_j$ is the share of country j's expenditure that is allocated to source i. Here, $\widehat{\Lambda}_{ij}$ represents the exogenous shock to the composite trade-friction term, defined consistently with Equation (21) as

$$\widehat{\Lambda}_{ij} = \widehat{\tau}_{ij}^{-\theta} \widehat{f}_{ij}^{-\frac{\theta}{\sigma-1}+1} \widehat{(1+t_{ij})}^{-\frac{\sigma\theta}{\sigma-1}}. \tag{27}$$

Note that Equation (26) reflects the key Melitz channel, whereby the price index P_j depends on the mass of entrants N_i and production costs c_i, governed by the trade elasticity θ. We follow Caliendo and Parro (2015) to handle trade deficits, assuming

$$\frac{D_i'}{Y_w'} = \frac{D_i}{Y_w}.$$

Since world GDP is used as the numeraire and is defined by

$$Y_w \equiv \sum_i w_i L_i,$$

we impose $\widehat{Y}_w = 1$, which implies $D_i' = D_i$. Combining Equations (15) and (16), the counterfactual

expenditure E_i' is therefore given by

$$E_i' = I_i' + (1-\beta_i)\sum_j M_{ij}' = w_i' L_i + D_i + T_i' + (1-\beta_i)\sum_j M_{ij}',$$

and

$$\widehat{E}_i E_i = \widehat{w}_i w_i L_i + D_i + T_i' + (1-\beta_i)\sum_j M_{ij}\widehat{M}_{ij}, \tag{28}$$

where counterfactual tariff revenue is

$$T_i' = \sum_k M_{ki}' t_{ki}'.$$

Next, the Cobb–Douglas cost structure, Equation (19), implies that the change in unit cost $\widehat{c}_i$ is

$$\widehat{c}_i = \widehat{w}_i^{\beta_i} \widehat{P}_i^{1-\beta_i}, \tag{29}$$

and the free-entry condition, Equation (20), implies that the change in the mass of firms $\widehat{N}_i$ is proportional to the change in real output scale

$$\widehat{N}_i = \widehat{Y}_i / \widehat{c}_i. \tag{30}$$

Finally, by the labor-market clearing condition, Equation (18), we have

$$\widehat{Y}_i = \widehat{w}_i, \tag{31}$$

while the world-GDP numeraire requires

$$\sum_i w_i' L_i = \sum_i \widehat{w}_i w_i L_i = Y_w.$$

Thus, using the system (24)–(31), we can solve for the vector of counterfactual changes

$$\{\widehat{c}_i, \widehat{N}_i, \widehat{\Pi}_i, \widehat{P}_i, \widehat{w}_i, \widehat{Y}_i, \widehat{E}_i\} \quad \text{for } i = 1, 2, \ldots, N,$$

given the exogenous shocks $\widehat{\Lambda}_{ij}$, observable baseline variables

$$\{\pi_{ij}, \lambda_{ij}, M_{ij}, E_i, Y_i, w_i L_i, D_i, t_{ij}\},$$

and parameter values

$$\{\sigma, \theta, \beta_i\}.$$

The welfare effects of the given exogenous shocks are evaluated based on real income or real output. Specifically, the welfare effects in the benchmark are measured by

$$\widehat{W}_i^1 = \widehat{I}_i / \widehat{P}_i; \quad \widehat{W}_i^2 = \widehat{Y}_i / \widehat{P}_i. \tag{32}$$

Finally, the general-equilibrium trade effect is given by recovering the counterfactual trade flows

$$M'_{ij} = M_{ij} \frac{\widehat{N}_i \widehat{c}_i^{-\theta} \widehat{\Lambda}_{ij} \widehat{P}_j^{\theta} \widehat{E}_j}{\widehat{(1+t_{ij})}}. \tag{33}$$

For the parameter values, we choose as the benchmark $\sigma = 5$, which lies within the range of trade elasticity often reported in the gravity literature (Head and Mayer, 2014). For $\{\beta_i\}$, we use the share of value added in gross output in country i, calculated as the median of the value-added shares across sectors obtained from Caliendo and Parro (2015). For the parameter θ, we follow Helpman et al. (2004) and adopt $\theta - (\sigma - 1) = 1$ as the benchmark.

3.2 Counterfactual Results

In the previous section, we obtained a preferred coefficient of $\widehat{\gamma}_1 = 0.869$ for the $bothAPEC_{ijt}$ indicator after controlling for observed tariffs. In our structural framework, this estimate captures

the APEC-related reduction in composite bilateral trade frictions, including variable trade costs and fixed market-entry costs beyond observed tariffs. We use this estimate to construct a "No-APEC" counterfactual while holding observed tariffs fixed.

To simulate the removal of APEC, we reverse the estimated reduction in trade frictions associated with common membership. Specifically, for each pair (i, j, t) in which both economies are APEC members, the shock in Equation (27) is set to

$$\widehat{\Lambda}_{ijt}^{Total} = \exp(-\widehat{\gamma}_1) = \exp(-0.869) \approx 0.419.$$

We feed this shock into Equations (24)–(31) and solve for the counterfactual equilibrium. The exercise removes the estimated improvement in composite trade frictions associated with APEC membership; it should not be interpreted as a literal increase in a single observed tariff. Comparing the factual and counterfactual equilibria allows us to quantify APEC's ex-post effects on welfare, trade, firm entry, and export participation.

Tables 7–10 report the economy-level effects of APEC relative to the no-APEC counterfactual for four representative years: 1990, 2000, 2010, and 2020. The outcomes include percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share of total production (π_{export}), and the import share of total expenditure (π_{import}). In addition to APEC members, the tables report results for selected major non-member trading economies, including Brazil, France, Germany, India, and the United Kingdom where data are available (Ossa, 2011, 2014).

The initial APEC effects are already substantial (Table 7). Most members gain in terms of real output, real income, trade flows, firm entry, and export participation. Singapore's real output and real income rise by 8.17% and 5.97%, respectively, while Brunei's real income increases by 21.04%. Malaysia, the Philippines, and Thailand also record meaningful welfare gains. The concentration of large gains among Southeast Asian members may reflect their central position in the Asia–Pacific region and their high degree of intraregional trade integration.

Trade effects for APEC members are generally much larger than welfare effects. Exports and imports may rise by tens of percentage points or by more than 100%, whereas real income typically rises by only a few percentage points. For example, Indonesia's imports increase by 131.46%, and the Philippines' exports increase by 95.04%. This difference arises because welfare also depends on wages, price indices, expenditure, and general-equilibrium feedbacks. The effects on the reported non-members are close to zero or modestly negative. These large trade responses are consistent with the estimated direct trade coefficient of 0.869.

The extensive-margin outcomes also increase for most APEC members. Both the mass of entrants and the proportion of firms serving foreign markets rise, and their magnitudes broadly track the welfare gains across economies. These results highlight the importance of firm entry, export participation, and non-tariff trade facilitation in evaluating APEC. Many members also experience an increase in the import share of expenditure and, in some cases, a decline in the export share of production. Thus, APEC expands gross trade while also changing the composition of production and expenditure.

As the APEC network expands from 1990 to 2000, 2010, and 2020, the gains become more widespread and remain substantial, although they are not monotonic for every economy (Tables 8, 9, and 10). For example, Singapore's real-output gains are 8.17% in 1990, 19.40% in 2000, and 16.10% in 2010. Canada's real-income gains are 3.93% in 1990, 8.84% in 2000, 5.18% in 2010, and 9.89% in 2020. The patterns for trade values, trade shares, export participation, and the mass of entrants are also broadly persistent across years. Figures 2 and 3 summarize these patterns.

Figure 2 shows that the gains expand during the enlargement phase and remain economically meaningful through 2020. This pattern suggests that APEC creates benefits through both deeper integration among existing members and expansion of the regional network. Figure 3 further shows that the distribution of welfare effects remains persistent over time.

In Figure 3, the member distribution lies clearly to the right of the non-member distribution for both real income and real output. Most member economies experience positive welfare gains, whereas the effects on non-members are much smaller and may be slightly positive or negative.

APEC therefore produces clear gains for members while generating only limited spillovers to non-members.

For the general-equilibrium trade effects, the upper-left panel reports changes in export and import values. APEC substantially increases member exports and imports, while the effects on non-members remain concentrated near zero. The upper-right panel reports changes in export and import shares. Together, these panels show that APEC changes both the scale and composition of trade without generating large effects on non-members.

The bottom-left panel reports firm-level extensive-margin adjustments. APEC expands the mass of domestic entrants and raises the weighted mass of firms serving foreign markets. Lower fixed and variable trade frictions relax export cutoffs, allowing additional firms to enter and export. These responses correspond directly to the extensive-margin channel in the model and distinguish the mechanism from that of a tariff-only homogeneous-firm framework. The result therefore illustrates why firm heterogeneity is important for understanding APEC's effects.

We next examine APEC's implications for global income inequality. Table 11 reports cross-country Gini coefficients under the factual equilibrium with APEC and the counterfactual equilibrium without APEC for each year from 1988 to 2020. The first two columns use nominal GDP, while the last two use real GDP. A lower Gini coefficient indicates less cross-country inequality. The nominal-GDP Gini is lower with APEC in every post-accession year reported, indicating a modest equalizing effect on nominal income. By contrast, the differences in the real-GDP Gini are quantitatively small and change sign over time because price-index adjustments differ across economies. The evidence that APEC reduces global inequality is therefore stronger for nominal income than for real income. Moreover, because some non-members experience small losses, the results should not be interpreted as a strict Pareto improvement.

To assess the robustness of the general-equilibrium results to alternative parameter values, we repeat the counterfactual analysis using different values of θ. The benchmark sets $\sigma = 5$ and $\theta = 5$, values within the range commonly used in the literature (Eaton and Kortum, 2002; Waugh, 2010; Head and Mayer, 2014; Simonovska and Waugh, 2014). We then consider $\theta = 8$ and $\theta = 10$

(Helpman et al., 2004; Chaney, 2008; Eaton et al., 2011). For $\theta = 8$, Tables A.1–A.4 report the economy-level effects for 1990, 2000, 2010, and 2020, while Table A.5 reports the implications for global income inequality. Figures A.1 and A.2 summarize the corresponding welfare, trade, and firm-level effects. The qualitative pattern is unchanged: members gain, and non-member effects remain small. However, the estimated magnitudes are smaller than under $\theta = 5$. A higher θ implies less dispersion in firm productivity and a higher trade elasticity, so a given observed trade response can be generated by a smaller change in underlying trade frictions; the implied welfare gains are therefore smaller (Chang et al., 2022). The same pattern holds for $\theta = 10$ (Tables A.6, A.7, A.8, A.9, and A.10; Figures A.3 and A.4).

4 Conclusions

This paper evaluates the trade and welfare effects of the Asia-Pacific Economic Cooperation (APEC) forum in a structural general equilibrium framework with heterogeneous firms. We develop a generalized Melitz model in which bilateral trade is shaped by variable trade costs, fixed export-entry costs, and tariffs, and combine this framework with reduced-form gravity estimation and counterfactual analysis. In doing so, we provide new evidence on the realized economic effects of APEC, a major regional forum whose role has received much less structural evaluation than formal trade agreements.

Our empirical results show that APEC has a large and robust positive direct effect on bilateral trade. This effect remains economically meaningful across alternative samples, specifications, and tariff controls, indicating that APEC operates through broader reductions in comprehensive trade frictions rather than through tariff liberalization alone. The counterfactual analysis further shows that these direct trade effects translate into sizable gains in real income, real output, trade flows, firm entry, and export participation for member economies. We also find that APEC contributes to lower global income inequality relative to a counterfactual world without it.

Overall, the results suggest that even a voluntary and weakly binding regional arrangement can

generate substantial economic benefits when it reduces both variable trade barriers and the fixed costs of accessing foreign markets. In this sense, APEC has functioned not only as a forum for dialogue, but also as an economically consequential institution for regional integration. In a period marked by deglobalization, protectionism, and geopolitical fragmentation, these findings highlight the continuing importance of regional economic cooperation in supporting trade and welfare.

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Table 1: Gravity Regression Results

	Pacific Rim				APEC+	
	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.: Trade Flows	PPML	PPML	PPML	PPML	PPML	PPML
bothAPEC$_{ijt}$	**0.528*** **	**0.531*** **	**0.520** **	**0.529** **	**0.568*** **	**0.577*** **
	(0.175)	**(0.173)**	**(0.243)**	**(0.244)**	**(0.198)**	**(0.199)**
GSP_{ijt}	-0.361***	-0.392***	-0.118**	-0.141***	-0.092	-0.117**
	(0.088)	(0.078)	(0.058)	(0.053)	(0.060)	(0.056)
$DiploDisag_{ijt}$	0.205***	0.200***	0.073**	0.069**	0.074**	0.069**
	(0.048)	(0.047)	(0.031)	(0.031)	(0.029)	(0.029)
RTA_{ijt}	0.095		0.043		0.049	
	(0.082)		(0.035)		(0.033)	
$\ln Dist_{ij}$	-0.699***	-0.728***				
	(0.067)	(0.063)				
$ComCol_{ij}$	0.516**	0.453**				
	(0.207)	(0.215)				
$Contig_{ij}$	0.588***	0.597***				
	(0.131)	(0.135)				
$Sibling_{ij}$	-0.345*	-0.321				
	(0.203)	(0.211)				
$HegD_{ij}$	-0.624**	-0.665**				
	(0.284)	(0.296)				
$ComLegPost_{ij}$	-0.182*	-0.194*				
	(0.101)	(0.101)				
$HegO_{ij}$	-0.143	-0.203				
	(0.220)	(0.224)				
$ComLegPre_{ij}$	0.170	0.172				
	(0.133)	(0.137)				
$ComLang_{ij}$	0.100	0.106				
	(0.100)	(0.101)				
Exporter-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Exporter-Importer FE	No	No	Yes	Yes	Yes	Yes
Observations	30,070	30,070	30,019	30,019	25,550	25,550
Pseudo-R^2	0.976	0.976	0.996	0.996	0.995	0.995

Notes: The table reports the gravity regression results based on Equation (22), for Pacific Rim sample (columns (1)–(4)) and APEC+ sample (columns (5)–(6)), respectively. Standard errors clustered at the country-pair level are reported in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 2: Gravity Regression Results with Tariffs: Pacific Rim

	Pacific Rim						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var.: Trade Flows	PPML	PPML	PPML	PPML	PPML	PPML	PPML
bothAPEC$_{ijt}$	**0.525*** **	**0.548*** **	**0.523*** **	**0.869*** **	**0.862*** **	**0.870*** **	**0.605** **
	(0.184)	**(0.184)**	**(0.184)**	**(0.269)**	**(0.267)**	**(0.268)**	**(0.251)**
RTA_{ijt}	0.105	0.092	0.114	0.046	0.052	0.045	0.047
	(0.088)	(0.085)	(0.087)	(0.033)	(0.032)	(0.033)	(0.036)
GSP_{ijt}	-0.355***	-0.359***	-0.355***	-0.090	-0.088	-0.090	-0.098*
	(0.092)	(0.092)	(0.092)	(0.056)	(0.056)	(0.056)	(0.057)
$DiploDisag_{ijt}$	0.195***	0.196***	0.194***	0.061**	0.063**	0.061**	0.067**
	(0.049)	(0.049)	(0.049)	(0.028)	(0.028)	(0.028)	(0.030)
$\ln(1+\text{Tariff}^{sa}_{ijt})$	0.354			-0.475			
	(0.818)			(0.297)			
$\ln(1+\text{Tariff}^{wa}_{ijt})$		-0.477			-0.202		
		(0.802)			(0.247)		
$\ln(1+\text{Tariff}^{la}_{ijt})$			0.902			-0.482	
			(0.869)			(0.305)	
Controls	Yes	Yes	Yes	No	No	No	No
Exporter-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter-Importer FE	No	No	No	Yes	Yes	Yes	Yes
Observations	18,502	18,280	18,502	18,456	18,235	18,456	25,734
Pseudo-R^2	0.973	0.973	0.973	0.997	0.997	0.997	0.996

Notes: The table reports the gravity regression results based on Equation (22), for Pacific Rim sample, with tariffs controlled for. Standard errors clustered at the country-pair level are reported in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 3: Gravity Regression Results with Tariffs: APEC+

	APEC+						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var.: Trade Flows	PPML	PPML	PPML	PPML	PPML	PPML	PPML
both$APEC_{ijt}$	**0.479****	**0.503****	**0.479****	**0.876*****	**0.869*****	**0.877*****	**0.590*****
	(0.214)	**(0.213)**	**(0.213)**	**(0.273)**	**(0.271)**	**(0.272)**	**(0.221)**
RTA_{ijt}	0.106	0.092	0.115	0.044	0.050	0.043	0.053
	(0.089)	(0.087)	(0.089)	(0.033)	(0.033)	(0.034)	(0.034)
GSP_{ijt}	-0.353***	-0.358***	-0.354***	-0.093	-0.091	-0.093	-0.078
	(0.094)	(0.093)	(0.094)	(0.057)	(0.057)	(0.057)	(0.059)
$DiploDisag_{ijt}$	0.187***	0.188***	0.186***	0.061**	0.064**	0.061**	0.067**
	(0.050)	(0.050)	(0.050)	(0.028)	(0.028)	(0.028)	(0.028)
$\ln(1+\text{Tariff}^{sa}_{ijt})$	0.423			-0.527*			
	(0.848)			(0.305)			
$\ln(1+\text{Tariff}^{wa}_{ijt})$		-0.459			-0.202		
		(0.839)			(0.257)		
$\ln(1+\text{Tariff}^{la}_{ijt})$			0.968			-0.538*	
			(0.901)			(0.313)	
Controls	Yes	Yes	Yes	No	No	No	No
Exporter-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter-Importer FE	No	No	No	Yes	Yes	Yes	Yes
Observations	11,868	11,792	11,868	11,865	11,789	11,865	21,603
Pseudo-R^2	0.969	0.969	0.969	0.996	0.996	0.996	0.996

Notes: The table reports the gravity regression results based on Equation (22), for APEC+ sample, with tariffs controlled for. Standard errors clustered at the country-pair level are reported in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 4: Gravity Regression Results with Tariff-Adjusted Trade Flows: Pacific Rim

	Pacific Rim						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	PPML	PPML	PPML	PPML	PPML	PPML	PPML
Tariff Measure	Simple avg.	Weighted avg.	Line avg.	Simple avg.	Weighted avg.	Line avg.	None
Dep. Var.	Tariff-adjusted trade flows						Trade flows
bothAPEC$_{ijt}$	**0.459****	**0.595*****	**0.471****	**0.919*****	**0.703*****	**0.912*****	**0.605****
	(0.189)	**(0.185)**	**(0.191)**	**(0.257)**	**(0.238)**	**(0.256)**	**(0.251)**
RTA_{ijt}	0.002	0.018	0.011	-0.068**	-0.096**	-0.078**	0.047
	(0.081)	(0.083)	(0.081)	(0.032)	(0.047)	(0.032)	(0.036)
GSP_{ijt}	-0.385***	-0.437***	-0.373***	-0.148***	-0.154**	-0.150***	-0.098*
	(0.081)	(0.090)	(0.082)	(0.052)	(0.064)	(0.052)	(0.057)
$DiploDisag_{ijt}$	0.217***	0.228***	0.219***	0.047	0.049	0.049	0.067**
	(0.046)	(0.048)	(0.047)	(0.032)	(0.034)	(0.032)	(0.030)
Controls	Yes	Yes	Yes	No	No	No	No
Exporter-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter-Importer FE	No	No	No	Yes	Yes	Yes	Yes
Observations	18,502	18,280	18,502	18,456	18,235	18,456	25,734
Pseudo-R^2	0.972	0.967	0.972	0.995	0.993	0.995	0.996

Notes: The table reports PPML gravity regressions for the Pacific Rim sample using the tariff-adjusted dependent variable $\widetilde{X}^m_{ijt} = X_{ijt}/(1+\text{Tariff}^m_{ijt})^{-\sigma\theta/(\sigma-1)}$, where $m \in \{sa, wa, la\}$ denotes the simple-average, trade-weighted-average, and line-average tariff measures, respectively. Columns (1)–(3) exclude exporter-importer fixed effects, whereas columns (4)–(6) include them. Column (7) uses unadjusted trade flows and no tariff measure. Standard errors clustered at the country-pair level are reported in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 5: Gravity Regression Results with Tariff-Adjusted Trade Flows: APEC+

	APEC+						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	PPML	PPML	PPML	PPML	PPML	PPML	PPML
Tariff Measure	Simple avg.	Weighted avg.	Line avg.	Simple avg.	Weighted avg.	Line avg.	None
Dep. Var.	Tariff-adjusted trade flows						Trade flows
bothAPEC$_{ijt}$	**0.387***	**0.538****	**0.397***	**0.932*****	**0.706*****	**0.923*****	**0.590*****
	(0.223)	**(0.218)**	**(0.224)**	**(0.259)**	**(0.240)**	**(0.259)**	**(0.221)**
RTA_{ijt}	0.004	0.022	0.013	-0.069**	-0.093*	-0.079**	0.053
	(0.083)	(0.084)	(0.082)	(0.033)	(0.048)	(0.033)	(0.034)
GSP_{ijt}	-0.383***	-0.436***	-0.371***	-0.151***	-0.155**	-0.153***	-0.078
	(0.082)	(0.092)	(0.083)	(0.053)	(0.064)	(0.053)	(0.059)
$DiploDisag_{ijt}$	0.210***	0.223***	0.212***	0.048	0.050	0.049	0.067**
	(0.047)	(0.049)	(0.047)	(0.032)	(0.035)	(0.032)	(0.028)
Controls	Yes	Yes	Yes	No	No	No	No
Exporter-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter-Importer FE	No	No	No	Yes	Yes	Yes	Yes
Observations	11,868	11,792	11,868	11,865	11,789	11,865	21,603
Pseudo-R^2	0.968	0.963	0.968	0.995	0.991	0.995	0.996

Notes: The table reports PPML gravity regressions for the APEC+ sample using the tariff-adjusted dependent variable $\widetilde{X}^m_{ijt} = X_{ijt}/(1+\text{Tariff}^m_{ijt})^{-\sigma\theta/(\sigma-1)}$, where $m \in \{sa, wa, la\}$ denotes the simple-average, trade-weighted-average, and line-average tariff measures, respectively. Columns (1)–(3) exclude exporter-importer fixed effects, whereas columns (4)–(6) include them. Column (7) uses unadjusted trade flows and no tariff measure. Standard errors clustered at the country-pair level are reported in parentheses. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 6: Dynamic Direct Trade Effects of APEC

	PPML	PPML	PPML
Tariff Measure	Simple avg.	Weighted avg.	Line avg.
Year	(1)	(2)	(3)
1991	1.776***	1.671***	1.787***
1992	1.415***	1.418***	1.420***
1993	0.998**	0.962**	0.998**
1994	0.323	0.312	0.322
1995	1.044***	1.031***	1.035***
1996	0.941***	0.957***	0.918***
1997	0.855***	0.757***	0.821***
1998	0.874***	0.771***	0.860***
1999	0.779***	0.778***	0.789***
2000	0.831***	0.726***	0.800***
2001	0.629**	0.565**	0.618**
2002	0.536**	0.523**	0.535**
2003	0.480*	0.457*	0.466*
2004	0.392	0.558**	0.472*
2005	0.430*	0.507**	0.476**
2006	0.409*	0.483**	0.460*
2007	0.512**	0.592***	0.555**
2008	0.409*	0.524**	0.455**
2009	0.509**	0.546**	0.521**
2010	0.298	0.486**	0.300
2011	0.258	0.299	0.250
2012	0.381*	0.430**	0.390*
2013	0.412*	0.467**	0.405*
2014	0.498**	0.495**	0.493**
2015	0.240	0.403*	0.242
2016	0.236	0.348	0.224
2017	0.367*	0.422**	0.355*
2018	0.646***	0.595***	0.641***
2019	0.561***	0.463*	0.563***
2020	0.388	0.426*	0.396

Notes: Standard errors are omitted here. The three columns correspond to the three tariff specifications used in the dynamic PPML estimation. The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 7: Economy-level Effects of APEC in 1990 Relative to the No-APEC Counterfactual

Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	0.84	1.13	30.51	30.33	0.49	6.25	-12.53	23.93
BRN	1	5.12	21.04	20.85	86.30	2.95	2.72	-16.95	54.40
CAN	1	2.90	3.93	62.06	71.28	1.68	10.10	-30.80	54.94
IDN	1	3.63	5.92	66.91	131.46	2.10	12.74	-12.61	112.73
JPN	1	0.93	1.03	42.74	56.64	0.54	8.78	6.02	55.31
KOR	1	4.18	5.56	78.88	74.41	2.42	14.42	11.43	70.35
MYS	1	3.25	5.35	20.82	27.17	1.56	4.64	-12.95	17.51
NZL	1	1.05	1.57	18.16	21.10	0.61	3.98	-11.09	15.29
PHL	1	4.01	5.77	95.04	74.84	2.32	17.04	6.81	67.00
SGP	1	8.17	5.97	21.13	14.86	4.69	3.71	-7.48	5.68
THA	1	2.47	4.25	28.22	27.20	1.43	6.79	-15.13	18.71
USA	1	0.73	0.84	43.94	29.83	0.43	9.15	13.60	31.55
BRA	0	-0.02	-0.04	-0.72	-1.22	-0.01	0.09	0.48	-0.71
DEU	0	-0.02	-0.03	-0.42	-0.47	-0.01	0.00	1.02	-0.33
FRA	0	0.00	0.00	-0.17	-0.16	0.00	0.05	0.63	0.00
GBR	0	-0.02	-0.03	-0.43	-0.33	-0.01	0.05	0.44	-0.29
IND	0	-0.05	-0.10	-1.39	-1.87	-0.03	-0.10	2.74	-1.84

Notes: The table reports the economy-level percentage effects of APEC in 1990, computed as $100 \times$ (With APEC $-$ No APEC)/No APEC. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table 8: Economy-level Effects of APEC in 2000 Relative to the No-APEC Counterfactual

Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	2.52	2.87	89.58	72.01	1.47	15.93	18.09	70.99
BRN	1	13.27	56.89	45.52	429.89	7.58	4.66	9.91	293.87
CAN	1	8.40	8.84	169.81	234.05	4.64	22.66	-3.94	201.62
CHL	1	1.41	1.98	20.59	25.94	0.82	4.95	-19.43	19.77
CHN	1	1.56	3.81	15.96	46.09	0.91	3.57	-20.24	34.90
HKG	1	0.53	-1.21	18.15	4.57	0.31	4.38	-7.33	1.71
IDN	1	4.64	8.03	44.12	158.37	2.69	8.59	-13.60	135.61
JPN	1	1.32	1.41	61.46	91.97	0.77	11.68	16.35	89.01
KOR	1	5.51	7.09	64.85	74.38	3.20	11.75	11.97	68.10
MEX	1	5.15	7.52	93.93	94.36	2.79	13.41	-37.92	69.82
MYS	1	30.26	75.14	62.19	150.21	16.77	7.59	18.95	87.06
NZL	1	3.87	4.05	83.92	89.34	2.16	14.81	5.31	84.47
PER	1	0.82	1.03	30.18	24.67	0.48	6.99	-16.91	19.66
PHL	1	9.71	14.23	67.44	137.66	5.58	11.28	33.58	113.09
PNG	1	5.35	11.48	30.67	72.55	3.10	4.87	-28.39	50.16
RUS	1	0.40	1.14	2.80	9.76	0.23	1.13	-5.87	7.74
SGP	1	19.40	15.91	84.45	49.21	10.96	13.43	36.79	36.87
THA	1	10.17	16.79	59.11	107.02	5.84	10.41	-1.00	85.72
USA	1	1.37	1.49	93.58	46.81	0.80	18.25	25.23	48.83
VNM	1	-5.72	-6.97	-31.38	-31.93	-3.40	13.80	45.92	-24.21
BRA	0	-0.03	-0.05	-1.41	-1.54	-0.02	0.15	2.15	-0.82
DEU	0	-0.10	-0.12	-1.59	-1.70	-0.06	-0.08	0.48	-1.10
FRA	0	-0.06	-0.04	-1.50	-1.32	-0.03	-0.09	0.28	-0.68
GBR	0	-0.10	-0.08	-2.29	-1.95	-0.06	-0.22	0.63	-1.22
IND	0	-0.09	-0.19	-2.34	-3.60	-0.06	-0.11	2.65	-2.88

Notes: The table reports the economy-level percentage effects of APEC in 2000, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table 9: Economy-level Effects of APEC in 2010 Relative to the No-APEC Counterfactual

Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	2.88	2.94	79.24	79.35	1.73	14.15	30.71	77.82
BRN	1	9.88	40.94	39.06	451.66	5.68	4.11	34.42	321.22
CAN	1	5.18	5.18	156.36	127.38	3.01	22.84	12.08	118.30
CHL	1	1.50	1.95	17.93	23.36	0.88	4.54	-12.00	17.36
CHN	1	1.17	1.95	17.10	30.54	0.66	3.95	-11.35	24.42
HKG	1	0.47	-0.83	14.72	2.23	0.29	3.67	0.49	0.90
IDN	1	3.44	3.66	85.04	147.71	1.95	15.68	34.78	137.20
JPN	1	1.81	1.89	60.03	68.60	1.06	11.32	21.48	68.25
KOR	1	6.31	8.32	47.34	58.95	3.65	8.58	11.28	53.75
MEX	1	4.44	5.71	69.96	77.31	2.48	11.38	-33.71	57.66
MYS	1	17.33	29.84	54.30	139.61	9.82	8.51	16.37	102.74
NZL	1	3.34	3.40	87.63	88.54	1.94	15.86	9.39	85.85
PER	1	1.13	1.29	24.06	24.29	0.65	6.44	-16.43	18.67
PHL	1	5.59	6.39	76.82	127.56	3.24	13.79	60.99	116.61
PNG	1	7.48	12.43	41.13	69.92	4.32	6.56	-27.49	46.88
RUS	1	0.29	0.66	3.65	7.50	0.17	1.19	-5.10	5.74
SGP	1	16.10	13.50	82.63	48.66	9.15	14.90	27.42	37.94
THA	1	9.63	13.35	58.73	88.88	5.53	11.18	10.42	73.46
USA	1	1.31	1.48	83.43	38.48	0.76	15.96	28.47	41.94
VNM	1	3.34	3.85	27.09	26.64	1.71	6.19	-6.64	18.02
BRA	0	-0.02	-0.01	-0.47	-0.54	-0.01	0.16	-1.87	-0.47
DEU	0	-0.13	-0.16	-1.19	-1.40	-0.08	-0.08	0.11	-1.17
FRA	0	-0.08	-0.07	-1.55	-1.33	-0.05	-0.15	-0.06	-0.98
GBR	0	-0.14	-0.11	-2.96	-2.15	-0.08	-0.38	0.49	-1.64
IND	0	-0.09	-0.09	-2.59	-1.84	-0.05	-0.24	-0.20	-1.45

Notes: The table reports the economy-level percentage effects of APEC in 2010, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table 10: Economy-level Effects of APEC in 2020 Relative to the No-APEC Counterfactual

Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	2.58	2.47	65.41	120.97	1.30	12.07	23.50	116.12
CAN	1	9.58	9.89	142.50	182.35	4.76	19.61	-3.04	160.62
CHL	1	3.43	4.91	17.70	23.94	1.73	3.62	-17.02	15.26
CHN	1	0.39	0.68	16.41	35.29	0.19	3.53	-13.02	29.43
HKG	1	-0.33	-1.58	7.80	0.81	-0.17	1.89	-7.37	-0.43
JPN	1	4.57	4.77	70.63	86.50	3.20	12.19	25.90	84.64
NZL	1	2.89	2.85	72.50	113.67	1.51	13.35	8.23	110.09
PER	1	2.90	2.98	21.78	22.36	1.94	4.97	-15.60	14.86
PHL	1	4.16	4.07	97.49	131.23	2.09	16.77	35.26	128.36
PNG	1	2.40	4.55	21.23	41.15	1.21	3.60	-31.03	29.66
RUS	1	0.25	0.45	5.84	8.40	0.13	1.14	-5.83	5.52
USA	1	0.70	0.86	94.12	39.68	0.35	17.66	30.62	44.94
BRA	0	0.07	0.17	1.52	2.39	0.04	0.53	-1.35	1.52
FRA	0	-0.10	-0.11	-2.55	-2.60	-0.05	-0.22	3.42	-2.33
GBR	0	-0.16	-0.16	-6.13	-4.08	-0.08	-0.90	-0.15	-3.78
IND	0	-0.16	-0.22	-6.25	-6.88	-0.08	-0.86	2.90	-6.52

Notes: The table reports the economy-level percentage effects of APEC in 2020, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table 11: Ex-post Effects of APEC on Global Income Disparity

	Gini coefficient: Nominal GDP		Gini coefficient: Real GDP	
Year	Factual w/ APEC	Counterfactual w/o APEC	Factual w/ APEC	Counterfactual w/o APEC
1988	0.6991	0.6991	0.7235	0.7235
1989	0.6945	0.6945	0.7248	0.7248
1990	0.7055	0.7080	0.7228	0.7223
1991	0.7122	0.7150	0.7209	0.7205
1992	0.7272	0.7337	0.7116	0.7123
1993	0.7224	0.7284	0.7056	0.7066
1994	0.7132	0.7146	0.7050	0.7057
1995	0.7038	0.7106	0.7023	0.7027
1996	0.6946	0.7014	0.6998	0.7003
1997	0.6901	0.6970	0.6988	0.6994
1998	0.7068	0.7122	0.6989	0.7002
1999	0.7084	0.7152	0.6988	0.6998
2000	0.7135	0.7206	0.6981	0.6993
2001	0.7177	0.7247	0.6957	0.6966
2002	0.7086	0.7153	0.6917	0.6919
2003	0.6902	0.6960	0.6874	0.6882
2004	0.6866	0.6942	0.6826	0.6838
2005	0.6761	0.6838	0.6775	0.6789
2006	0.6628	0.6697	0.6713	0.6723
2007	0.6371	0.6412	0.6645	0.6653
2008	0.6328	0.6360	0.6572	0.6580
2009	0.6320	0.6342	0.6462	0.6465
2010	0.6168	0.6183	0.6408	0.6409
2011	0.6206	0.6215	0.6364	0.6364
2012	0.6306	0.6313	0.6338	0.6333
2013	0.6386	0.6394	0.6298	0.6294
2014	0.6433	0.6447	0.6272	0.6265
2015	0.6505	0.6522	0.6256	0.6249
2016	0.6218	0.6234	0.6213	0.6198
2017	0.6322	0.6336	0.6211	0.6196
2018	0.6331	0.6350	0.6178	0.6154
2019	0.6444	0.6461	0.6164	0.6147
2020	0.6379	0.6395	0.6171	0.6154

Notes: The table reports the Gini coefficients of cross-country income under the factual equilibrium with APEC and the counterfactual equilibrium without APEC for each year from 1988 to 2020. The first two columns report the Gini coefficients based on nominal GDP, and the last two columns report the Gini coefficients based on real GDP. A lower Gini coefficient indicates lower global income inequality. Differences between the factual and counterfactual values capture the ex-post effect of APEC on global income inequality.

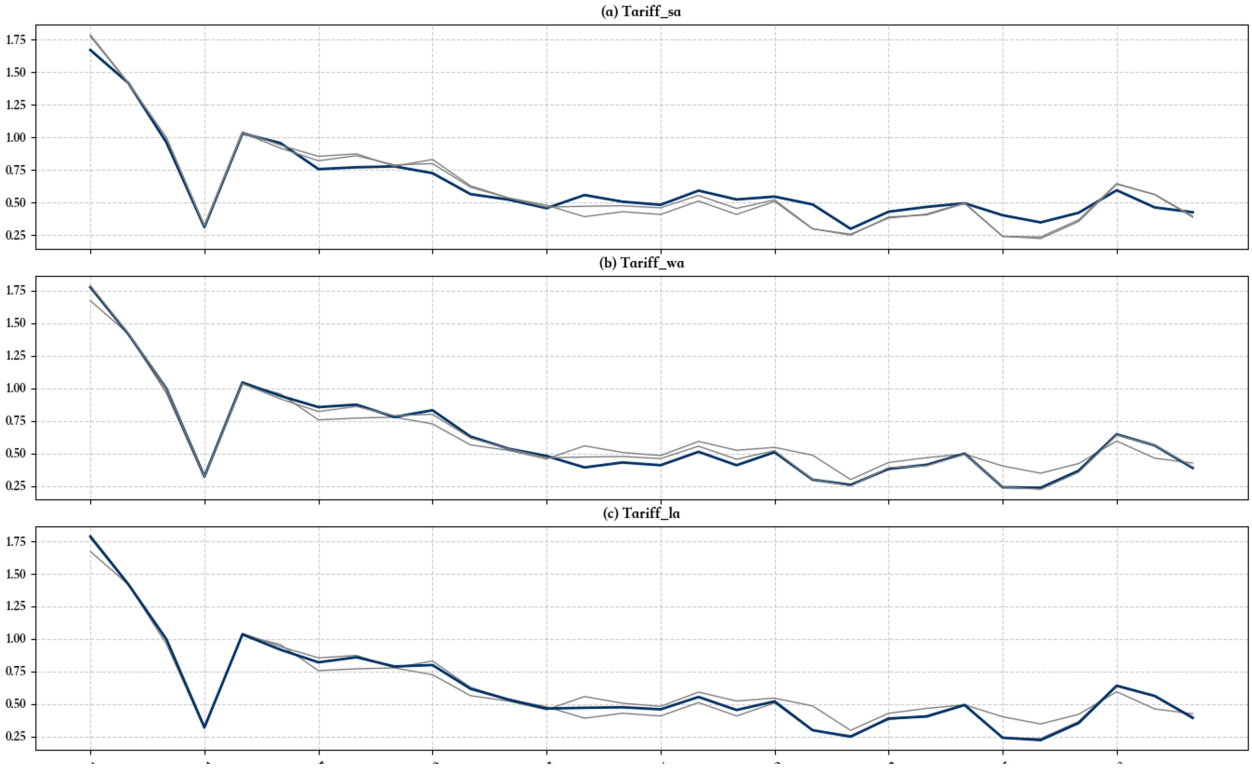
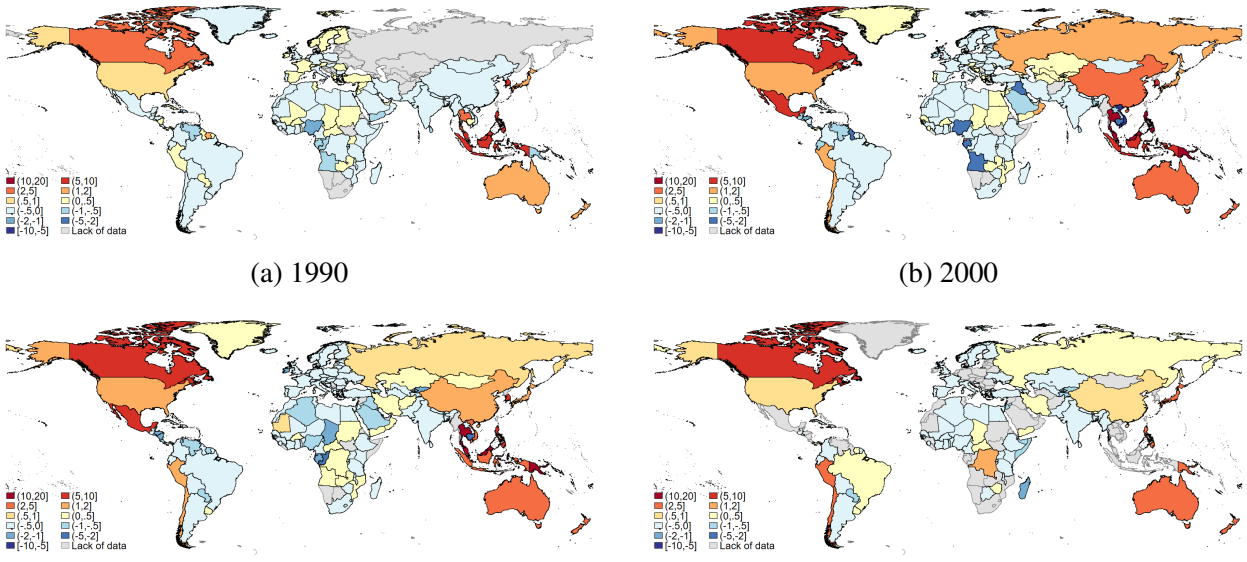


Figure 1: Dynamic Direct Trade Effects of APEC

Notes: Each panel shows the direct trade effects of APEC across years. Panels (a), (b), (c) correspond to the gravity regressions with different tariffs (simple average, weighted average, and tariff line average) controlled for.

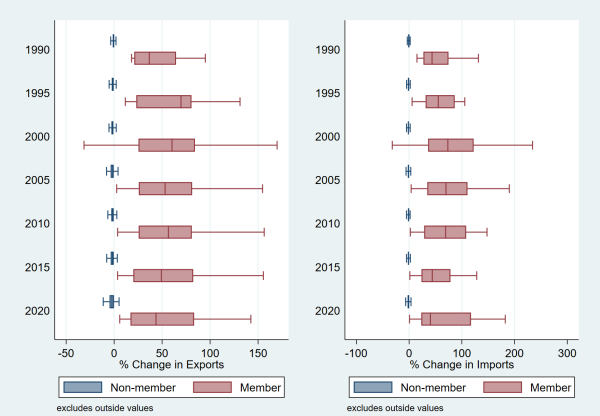


(a) 1990 (b) 2000

(c) 2010 (d) 2020

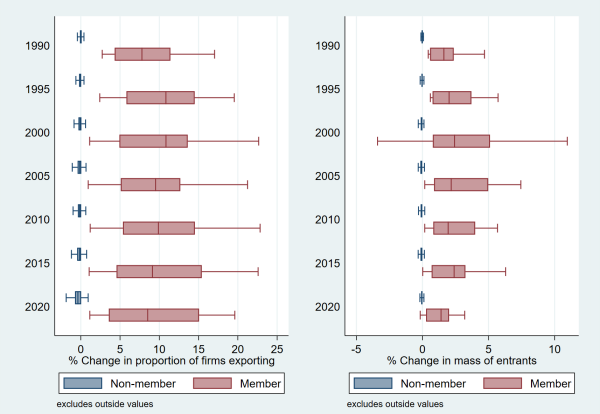
Figure 2: Economy-level Ex-post Effects of APEC on Real Income

Notes: Each panel shows the economy-level ex-post percentage change in real income in the indicated year, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. The benchmark parameter values are $\sigma = 5$ and $\theta = 5$. Positive values indicate that APEC increases real income relative to the no-APEC counterfactual, while negative values indicate income losses. The figure includes both APEC members and non-members and therefore reflects both direct effects and general-equilibrium spillovers.

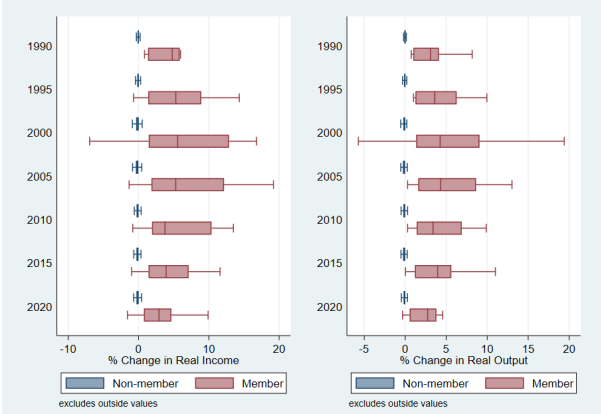


(a) Trade values

(b) Trade shares



(c) Exporting participation and mass of entrants



(d) Welfare

Figure 3: Distribution of Economy-level Ex-post Effects of APEC

Notes: The figure reports the distribution of economy-level ex-post effects of APEC under $\sigma = 5$ and $\theta = 5$, measured relative to the no-APEC counterfactual. Each panel summarizes the percentage effect computed as $100 \times \frac{\text{With APEC} - \text{No APEC}}{\text{No APEC}}$. Panel (a) reports the effects on trade values, including exports and imports. Panel (b) reports the effects on trade shares, including the export share in total production and the import share in total expenditure. Panel (c) reports the effects on the mass of entrants and the proportion of firms exporting. Panel (d) reports the effects on welfare. The figure includes both APEC members and non-members and therefore reflects both direct effects on member economies and general-equilibrium spillover effects on non-member economies.

Appendix

A Equilibrium Conditions and Algorithm

ID	Level equation	Scope
A1	$c_i = w_i^{\beta_i} P_i^{1-\beta_i}$	$\forall i$
A2	$P_j = \left(\sum_i \Phi_{ij}\right)^{\frac{1}{1-\sigma}}, \qquad \Phi_{ij} \equiv \left(\frac{\sigma}{\sigma-1} c_i \tau_{ij}(1+t_{ij})\right)^{1-\sigma} N_i V_{ij}$	$\forall j$
A3	$\frac{X_{ij}}{E_j} = \pi_{ij} = \frac{\Phi_{ij}}{\sum_n \Phi_{nj}}, \qquad X_j \equiv E_j = \sum_i X_{ij}$	$\forall i,j$
A3'	$\pi_{ij} = \left(\frac{\sigma}{\sigma-1}\frac{c_i \tau_{ij}(1+t_{ij})}{P_j}\right)^{1-\sigma} N_i V_{ij} = \frac{\Phi_{ij}}{(P_j)^{1-\sigma}}$	$\forall i$
A4	$\frac{1}{\sigma}\frac{1}{(1+t_{ij})}(a_{ij})^{1-\sigma}\pi_{ij}E_j = N_i V_{ij} c_i f_{ij}$	$\forall i,j$
A4"	$V_{ij} = \left(\frac{\theta F_i}{\beta_i(\sigma-1)(1+t_{ij})f_{ij}}\frac{\pi_{ij}E_j}{Y_i}\right)^{\frac{\theta-\sigma+1}{\theta}} \left(\frac{\theta-\sigma+1}{\theta}\right)^{\frac{1-\sigma}{\theta}} \bar{a}_i^{1-\sigma}$	$\forall i,j$
A5	$\beta_i \frac{\sigma-1}{\sigma\theta} Y_i = N_i F_i c_i$	$\forall i$
A6	$V_{ij} = \frac{\theta}{\theta-\sigma+1}\frac{a_{ij}^{\theta-\sigma+1}}{\bar{a}_i^{\theta}}$	$\forall i,j$
A7	$M_{ij} \equiv \frac{X_{ij}}{1+t_{ij}}, \qquad Y_i = \sum_j M_{i\to j}, \qquad Y_w \equiv \sum_i Y_i$	$\forall i,j$
A7'	$e_j^{\text{adjust}} = \frac{\sum_i M_{ij}}{Y_w}, \qquad e_j = \frac{X_j}{Y_w}, \qquad s_j \equiv \frac{Y_i}{Y_w}$	$\forall j$
A8	$I_i \equiv w_i L_i + D_i + T_i, \qquad T_i = \sum_j M_{ji} t_{ji}$	$\forall i$
A9	$X_i = I_i + (1-\beta_i)\sum_j M_{ij}, \qquad X_i = w_i L_i + D_i + T_i + (1-\beta_i)\sum_j \frac{X_{ij}}{1+t_{ij}}$	$\forall i$
A10	$\sum_j \frac{X_{ji}}{1+t_{ji}} = \sum_j \frac{X_{ij}}{1+t_{ij}} + D_i, \qquad \sum_j M_{ji} = \sum_j M_{ij} + D_i$	$\forall j$
A10'	$w_i L_i = \beta_i \sum_j \frac{X_{ij}}{1+t_{ij}}, \qquad w_i L_i = \beta_i\left(1 - \frac{\sigma-1}{\sigma\theta} + \frac{\sigma-1}{\sigma\theta}\right) Y_i$	$\forall i$

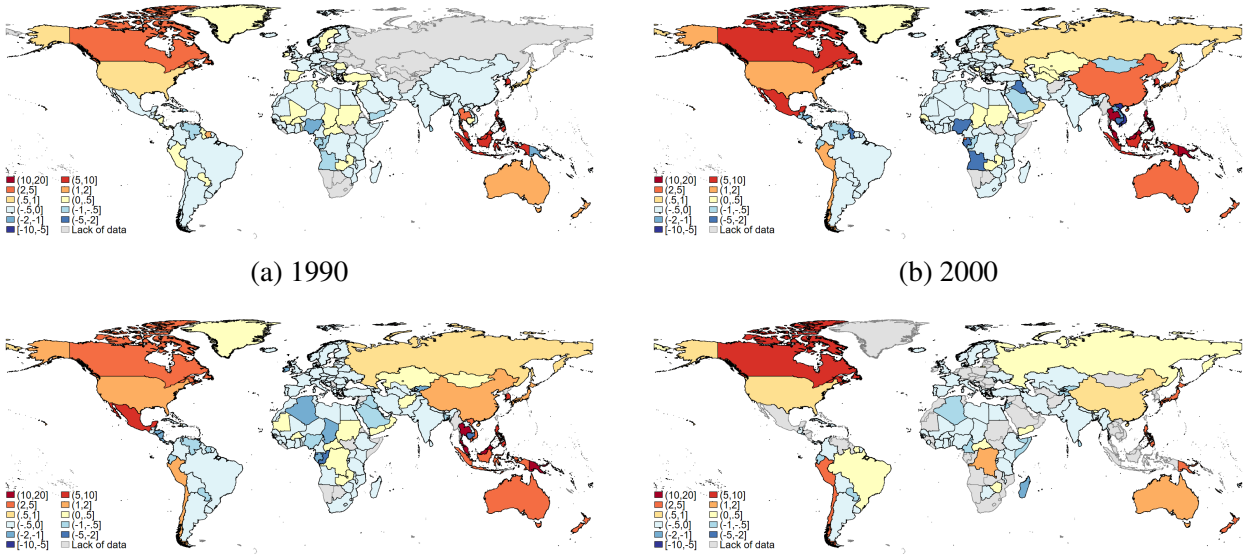
ID	Hat equation	Scope
H1	$\hat{c}_i = \hat{w}_i^{\beta_i}\hat{P}_i^{1-\beta_i}$	$\forall i$
H2	$\hat{\Phi}_{ij} = \left(\hat{c}_i\hat{\tau}_{ij}\widehat{(1+t_{ij})}\right)^{1-\sigma}\hat{N}_i\hat{V}_{ij}, \qquad \hat{P}_j^{1-\sigma} = \sum_i \pi_{ij}\hat{\Phi}_{ij}, \qquad \hat{P}_j = \left(\sum_i \pi_{ij}\hat{\Phi}_{ij}\right)^{\frac{1}{1-\sigma}}$	$\forall i,j$
H3	$\hat{X}_{ij} = \hat{\pi}_{ij}\hat{E}_j, \qquad \hat{E}_j = \hat{X}_j = \sum_i \pi_{ij}\hat{X}_{ij}$	$\forall i,j$
H3'	$\hat{\pi}_{ij} = \left(\frac{\hat{c}_i\hat{\tau}_{ij}\widehat{(1+t_{ij})}}{\hat{P}_j}\right)^{1-\sigma}\hat{N}_i\hat{V}_{ij} = \frac{\hat{\Phi}_{ij}}{\hat{P}_j^{1-\sigma}}$	$\forall i,j$
H4	$\frac{\hat{a}_{ij}^{1-\sigma}\hat{\pi}_{ij}\hat{E}_j}{\widehat{(1+t_{ij})}} = \hat{N}_i\hat{V}_{ij}\hat{c}_i\hat{f}_{ij}, \qquad \text{equivalently} \qquad \hat{a}_{ij}^{1-\sigma} = \frac{\hat{N}_i\hat{V}_{ij}\hat{c}_i\hat{f}_{ij}\widehat{(1+t_{ij})}}{\hat{\pi}_{ij}\hat{E}_j}$	$\forall i,j$
H4"	$\hat{V}_{ij} = \left(\frac{\hat{\pi}_{ij}\hat{E}_j}{\hat{Y}_i\widehat{(1+t_{ij})}\hat{f}_{ij}}\right)^{\frac{\theta-\sigma+1}{\theta}}$	$\forall i,j$
H5	$\hat{Y}_i = \hat{N}_i\hat{c}_i, \qquad \text{equivalently} \qquad \hat{N}_i = \frac{\hat{Y}_i}{\hat{c}_i}$	$\forall i$
H6	$\hat{V}_{ij} = \hat{a}_{ij}^{\theta-\sigma+1}, \qquad \text{equivalently} \qquad \hat{a}_{ij} = \hat{V}_{ij}^{\frac{1}{\theta-\sigma+1}}$	$\forall i,j$
H7	$\hat{M}_{ij} = \frac{\hat{X}_{ij}}{\widehat{(1+t_{ij})}}, \qquad \hat{Y}_i = \sum_j \frac{M_{ij}}{Y_i}\hat{M}_{ij}, \qquad \hat{Y}_w = \sum_i s_i\hat{Y}_i, \qquad \hat{e}_j = \frac{\hat{E}_j}{\hat{Y}_w}$	$\forall i,j$
H7'	$\hat{e}_j^{\text{adjust}} = \frac{\sum_i \mu_{ij}\hat{M}_{ij}}{\hat{Y}_w}, \qquad \mu_{ij} \equiv \frac{M_{ij}}{\sum_n M_{nj}}, \qquad \hat{e}_j = \frac{\hat{X}_j}{\hat{Y}_w}, \qquad \hat{s}_i = \frac{\hat{Y}_i}{\hat{Y}_w}$	$\forall j$
H8	$\hat{I}_i = \frac{w_i L_i}{I_i}\hat{w}_i + \frac{D_i}{I_i} + \frac{T_i}{I_i}\hat{T}_i, \qquad \hat{T}_i = \sum_j \omega_{ji}^T \hat{M}_{ji}\widetilde{t}_{ji}$	$\forall i$
H9	$\hat{X}_i = \frac{I_i}{X_i}\hat{I}_i + (1-\beta_i)\sum_j \frac{M_{ij}}{X_i}\hat{M}_{ij}, \qquad X_i \equiv E_i$	$\forall i$
H10	$\sum_j M_{ji}\hat{M}_{ji} = \sum_j M_{ij}\hat{M}_{ij} + D_i$	$\forall i$
H10'	$\hat{w}_i\hat{L}_i = \hat{Y}_i \implies \hat{w}_i = \hat{Y}_i$	$\forall i$

Notes: Throughout, $\hat{x} \equiv x'/x$. The only exogenous hat shocks are $\hat{f}_{ij}$, $\hat{\tau}_{ij}$, and $\widehat{(1+t_{ij})}$. All other exogenous variables are fixed, so $\hat{L}_i = \hat{F}_i = \hat{\bar{a}}_i = \hat{D}_i = 1$. We define $s_i \equiv Y_i/Y_w$, $\omega_{ji}^T \equiv M_{ji}t_{ji}/T_i$, and $\widetilde{t}_{ji} \equiv t'_{ji}/t_{ji} = \left((1+t_{ji})\widehat{(1+t_{ji})} - 1\right)/t_{ji}$.

Algorithm Numerical Solution of the Hat System

1. Start from initial guesses for $\hat{w}_i$, $\hat{P}_i$, $\hat{N}_i$, and $\hat{V}_{ij}$.
2. Given the current guesses, update the equilibrium objects in the following order:
   (a) Update the input-bundle cost and the bilateral trade kernel using conditions H1 and H2.
   (b) Update the CES price index and bilateral trade shares using conditions H2 and H3′.
   (c) Update bilateral expenditure flows, tariff-exclusive trade flows, country output, and world output using conditions H3, H7, and H7′.
   (d) Update tariff revenue, nominal income, and total expenditure using conditions H8 and H9.
   (e) Update entrant mass, cutoff productivity, and weighted exporting mass using conditions H5, H4, and H6 (or equivalently H4″).
   (f) Update wages using condition H10′.
   (g) Impose the world-GDP numeraire and normalize the system so that solved world GDP matches the exogenous target.
   (h) Apply damping to the updated variables.
3. Check convergence for the main unknowns. If the convergence criterion is satisfied, stop. Otherwise, return to step 2.

B Robustness Checks

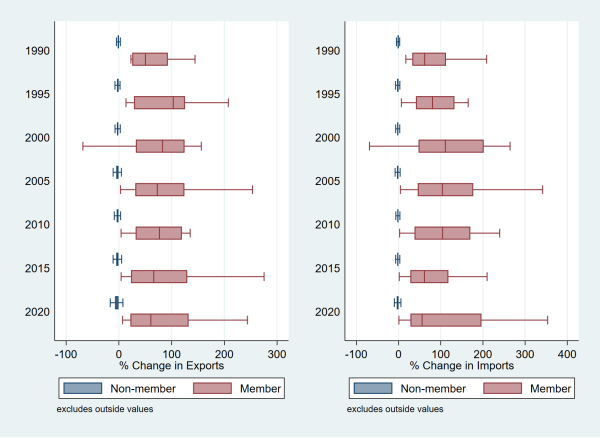


(a) 1990 (b) 2000

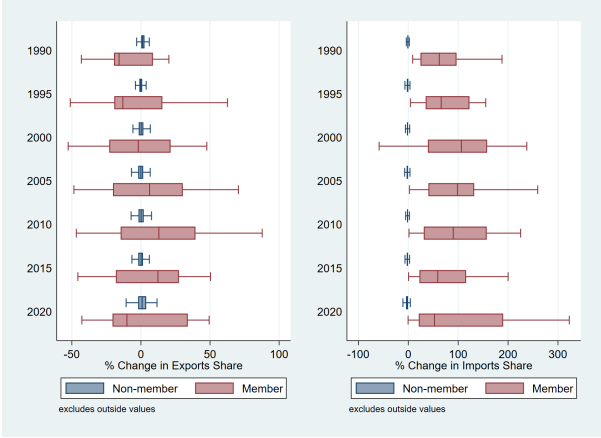
(c) 2010 (d) 2020

Figure A.1: Economy-level Ex-post Effects of APEC on Real Income under $\sigma = 5$ and $\theta = 8$

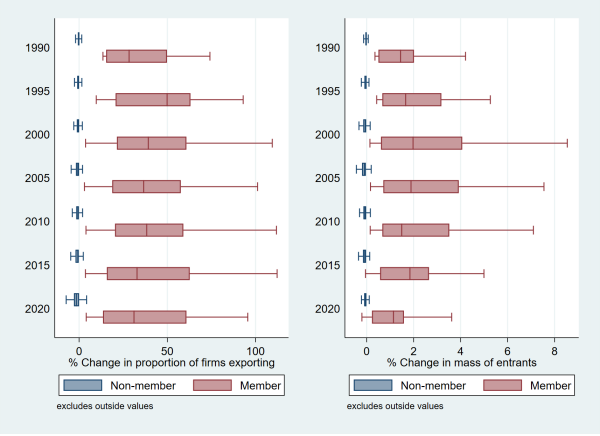
Notes: Each panel shows the economy-level ex-post percentage change in real income in the indicated year, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. The results are based on the alternative parameter values $\sigma = 5$ and $\theta = 8$. Positive values indicate that APEC increases real income relative to the no-APEC counterfactual, while negative values indicate income losses. The figure includes both APEC members and non-members and therefore captures both direct effects and general-equilibrium spillovers.



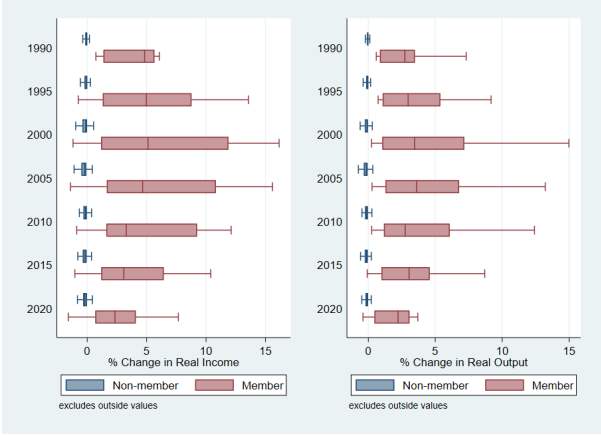
(a) Trade values



(b) Trade shares



(c) Exporting participation and mass of entrants



(d) Welfare

Figure A.2: Distribution of Economy-level Ex-post Effects of APEC under $\sigma = 5$ and $\theta = 8$

Notes: The figure reports the distribution of economy-level ex-post effects of APEC under $\sigma = 5$ and $\theta = 8$, measured relative to the no-APEC counterfactual. Each panel summarizes the percentage effect computed as $100 \times \frac{\text{With APEC} - \text{No APEC}}{\text{No APEC}}$. Panel (a) reports the effects on trade values, including exports and imports. Panel (b) reports the effects on trade shares, including the export share in total production and the import share in total expenditure. Panel (c) reports the effects on the mass of entrants and the proportion of firms exporting. Panel (d) reports the effects on welfare. The figure includes both APEC members and non-members and therefore reflects both direct effects on member economies and general-equilibrium spillover effects on non-member economies.

Table A.1: Economy-level Effects of APEC in 1990 Relative to the No-APEC Counterfactual ($\sigma = 5$, $\theta = 8$)

Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	0.76	1.14	41.11	40.85	0.45	24.10	-17.45	35.09
BRN	1	5.45	20.57	25.92	123.52	3.14	14.09	-26.26	88.72
CAN	1	2.63	3.95	94.33	111.64	1.53	46.68	-43.13	93.56
IDN	1	3.11	5.65	91.27	208.67	1.80	52.94	-19.17	187.86
JPN	1	0.75	0.88	59.73	82.35	0.44	32.55	7.04	81.22
KOR	1	3.52	5.27	121.41	113.00	2.04	60.11	17.01	109.05
MYS	1	2.83	5.04	24.40	32.14	1.36	16.19	-16.74	23.71
NZL	1	0.96	1.60	22.81	26.67	0.56	14.49	-14.93	21.48
PHL	1	3.43	5.67	144.35	107.88	1.99	74.14	10.34	99.83
SGP	1	7.31	6.07	24.63	17.17	4.21	13.49	-11.87	8.75
THA	1	2.31	4.62	34.23	32.94	1.34	23.94	-19.84	25.24
USA	1	0.59	0.73	63.72	41.44	0.35	33.48	20.21	43.07
BRA	0	-0.02	-0.06	-1.11	-1.86	-0.01	0.04	0.72	-1.43
DEU	0	-0.03	-0.04	-0.67	-0.76	-0.02	-0.12	1.42	-0.66
FRA	0	0.00	0.00	-0.29	-0.27	0.00	0.07	0.94	-0.15
GBR	0	-0.04	-0.05	-0.93	-0.72	-0.02	-0.11	0.57	-0.71
IND	0	-0.06	-0.16	-2.30	-3.10	-0.04	-0.66	3.97	-3.05

Notes: The table reports the economy-level percentage effects of APEC in 1990, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table A.2: Economy-level Effects of APEC in 2000 Relative to the No-APEC Counterfactual ($\sigma = 5$, $\theta = 8$)

Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	2.02	2.48	141.64	108.05	1.18	68.81	25.75	107.46
BRN	1	12.04	51.30	54.42	1060.28	6.89	20.62	3.91	780.30
CAN	1	6.25	6.92	276.66	448.54	3.47	109.48	-17.19	398.03
CHL	1	1.21	1.84	25.49	32.46	0.71	17.73	-26.09	26.97
CHN	1	1.53	3.74	20.14	62.37	0.90	14.60	-29.21	51.66
HKG	1	0.24	-1.19	19.17	4.80	0.14	14.40	-15.01	2.41
IDN	1	3.88	7.09	56.82	264.28	2.26	34.27	-22.26	237.56
JPN	1	1.05	1.17	89.80	147.20	0.61	46.77	17.12	143.87
KOR	1	4.58	6.51	94.09	110.81	2.66	47.95	11.19	105.27
MEX	1	4.74	7.95	156.26	157.23	2.57	68.49	-52.69	126.72
MYS	1	26.71	67.83	84.34	252.28	14.90	34.27	16.66	172.27
NZL	1	3.02	3.29	128.17	138.62	1.69	62.73	5.12	133.04
PER	1	0.71	1.01	38.82	31.35	0.41	25.61	-23.62	26.84
PHL	1	8.08	12.73	96.07	238.60	4.67	47.98	42.98	207.72
PNG	1	5.16	11.06	41.58	111.01	2.99	22.16	-41.40	86.21
RUS	1	0.37	0.96	3.24	11.42	0.22	3.69	-7.75	9.85
SGP	1	14.98	12.71	120.82	65.04	8.54	58.86	47.68	55.61
THA	1	8.78	16.15	81.04	165.19	5.06	43.11	-7.88	141.25
USA	1	1.04	1.17	139.74	62.46	0.61	72.31	36.62	64.12
VNM	1	-17.88	-22.35	-68.29	-68.83	-10.92	35.34	231.24	-58.45
BRA	0	-0.05	-0.09	-2.22	-2.43	-0.03	-0.02	3.03	-1.92
DEU	0	-0.11	-0.13	-2.20	-2.36	-0.07	-0.52	0.47	-1.91
FRA	0	-0.07	-0.05	-1.97	-1.74	-0.04	-0.47	0.08	-1.25
GBR	0	-0.12	-0.10	-3.14	-2.69	-0.07	-1.00	0.66	-2.15
IND	0	-0.12	-0.27	-3.70	-5.64	-0.07	-0.85	3.70	-5.01

Notes: The table reports the economy-level percentage effects of APEC in 2000, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table A.3: Economy-level Effects of APEC in 2010 Relative to the No-APEC Counterfactual ($\sigma = 5$, $\theta = 8$)

Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	2.25	2.38	121.82	122.04	1.35	57.97	44.13	120.07
BRN	1	9.10	37.57	45.98	1121.63	5.23	18.99	44.12	848.99
CAN	1	3.90	4.03	269.81	203.15	2.27	111.84	13.03	192.17
CHL	1	1.25	1.66	21.79	28.68	0.73	15.89	-16.90	23.52
CHN	1	1.07	1.88	22.45	41.58	0.60	14.99	-16.56	35.91
HKG	1	0.25	-0.88	17.46	2.59	0.15	11.97	-1.49	1.43
IDN	1	2.60	2.96	119.20	239.64	1.48	60.90	41.28	225.10
JPN	1	1.44	1.56	89.86	105.50	0.84	44.66	28.53	105.05
KOR	1	5.35	7.84	67.91	87.58	3.10	32.77	14.66	82.45
MEX	1	3.91	5.50	105.63	119.37	2.18	54.53	-46.80	97.78
MYS	1	14.11	25.16	71.57	223.27	8.03	33.35	15.89	180.36
NZL	1	2.58	2.70	135.18	136.95	1.50	66.40	12.86	133.91
PER	1	0.91	1.10	28.96	29.25	0.52	21.72	-22.12	24.56
PHL	1	4.39	5.37	111.08	211.51	2.55	54.85	87.77	197.84
PNG	1	6.81	11.59	56.05	102.92	3.93	29.53	-39.45	78.33
RUS	1	0.27	0.63	4.18	8.63	0.16	3.91	-6.92	7.32
SGP	1	12.41	10.65	119.60	65.03	7.10	60.21	37.62	56.52
THA	1	8.00	12.11	82.02	134.25	4.61	43.30	12.77	117.54
USA	1	1.02	1.21	130.19	52.80	0.59	64.38	43.75	56.20
VNM	1	2.90	3.62	34.64	34.05	1.48	23.05	-12.85	26.16
BRA	0	-0.03	-0.04	-1.39	-1.62	-0.02	0.03	-2.61	-1.57
DEU	0	-0.15	-0.18	-1.81	-2.12	-0.09	-0.49	0.35	-1.99
FRA	0	-0.08	-0.08	-2.18	-1.87	-0.05	-0.70	0.07	-1.63
GBR	0	-0.15	-0.14	-4.25	-3.09	-0.09	-1.63	0.75	-2.73
IND	0	-0.11	-0.14	-4.11	-2.94	-0.06	-1.31	-0.06	-2.66

Notes: The table reports the economy-level percentage effects of APEC in 2010, computed as $100 \times$ (With APEC $-$ No APEC)/No APEC. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table A.4: Economy-level Effects of APEC in 2020 Relative to the No-APEC Counterfactual ($\sigma = 5$, $\theta = 8$)

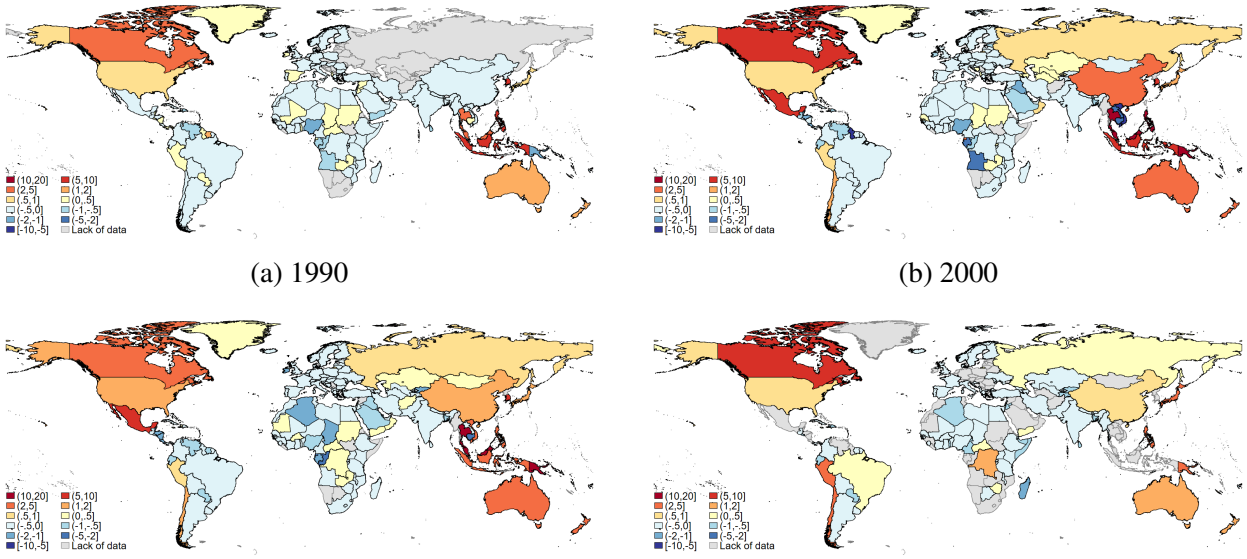
Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	1.97	1.92	93.44	201.84	0.99	45.34	30.87	194.48
CAN	1	7.25	7.67	243.85	353.34	3.62	95.59	-12.70	322.73
CHL	1	2.98	4.21	21.57	29.53	1.50	13.23	-24.13	21.86
CHN	1	0.36	0.65	22.21	50.67	0.18	13.83	-19.25	44.95
HKG	1	-0.40	-1.59	8.04	0.83	-0.20	5.79	-12.07	-0.36
JPN	1	3.70	3.96	112.22	145.41	2.58	50.62	36.94	144.22
NZL	1	2.23	2.24	107.74	191.13	1.17	52.56	10.34	185.77
PER	1	2.36	2.43	26.05	26.76	1.58	16.90	-21.89	20.34
PHL	1	3.17	3.28	152.14	226.49	1.60	69.07	49.38	221.66
PNG	1	2.22	4.24	27.68	56.50	1.12	14.72	-42.79	45.13
RUS	1	0.22	0.42	6.89	9.95	0.11	4.03	-8.20	7.35
USA	1	0.55	0.71	153.88	55.07	0.28	74.40	48.35	60.19
BRA	0	0.03	0.10	0.86	1.35	0.01	1.37	-1.39	0.63
FRA	0	-0.11	-0.13	-4.08	-4.15	-0.06	-1.23	5.49	-4.02
GBR	0	-0.17	-0.19	-9.37	-6.32	-0.09	-3.83	-0.24	-6.18
IND	0	-0.18	-0.28	-9.74	-10.69	-0.09	-3.79	4.51	-10.45

Notes: The table reports the economy-level percentage effects of APEC in 2020, computed as $100 \times$ (With APEC $-$ No APEC)/No APEC. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table A.5: Ex-post Effects of APEC on Global Income Disparity ($\sigma = 5$, $\theta = 8$)

	Gini coefficient: Nominal GDP		Gini coefficient: Real GDP	
Year	Factual w/ APEC	Counterfactual w/o APEC	Factual w/ APEC	Counterfactual w/o APEC
1988	0.6991	0.6991	0.7235	0.7235
1989	0.6945	0.6945	0.7248	0.7248
1990	0.7055	0.7076	0.7228	0.7224
1991	0.7122	0.7146	0.7209	0.7206
1992	0.7272	0.7328	0.7116	0.7124
1993	0.7224	0.7278	0.7056	0.7067
1994	0.7132	0.7143	0.7050	0.7058
1995	0.7038	0.7098	0.7023	0.7028
1996	0.6946	0.7007	0.6998	0.7004
1997	0.6901	0.6963	0.6988	0.6996
1998	0.7068	0.7117	0.6989	0.7002
1999	0.7084	0.7142	0.6988	0.6996
2000	0.7135	0.7195	0.6981	0.6989
2001	0.7177	0.7235	0.6957	0.6960
2002	0.7086	0.7138	0.6917	0.6911
2003	0.6902	0.6954	0.6874	0.6883
2004	0.6866	0.6935	0.6826	0.6839
2005	0.6761	0.6831	0.6775	0.6790
2006	0.6628	0.6690	0.6713	0.6724
2007	0.6371	0.6408	0.6645	0.6654
2008	0.6328	0.6356	0.6572	0.6581
2009	0.6320	0.6340	0.6462	0.6466
2010	0.6168	0.6182	0.6408	0.6410
2011	0.6206	0.6214	0.6364	0.6365
2012	0.6306	0.6313	0.6338	0.6334
2013	0.6386	0.6394	0.6298	0.6296
2014	0.6433	0.6445	0.6272	0.6267
2015	0.6505	0.6520	0.6256	0.6251
2016	0.6218	0.6233	0.6213	0.6201
2017	0.6322	0.6335	0.6211	0.6198
2018	0.6331	0.6348	0.6178	0.6157
2019	0.6444	0.6460	0.6164	0.6149
2020	0.6379	0.6394	0.6171	0.6157

Notes: The table reports the Gini coefficients of cross-country income under the factual equilibrium with APEC and the counterfactual equilibrium without APEC for each year from 1988 to 2020. The first two columns report the Gini coefficients based on nominal GDP, and the last two columns report the Gini coefficients based on real GDP. A lower Gini coefficient indicates lower global income inequality. Differences between the factual and counterfactual values capture the ex-post effect of APEC on global income inequality.

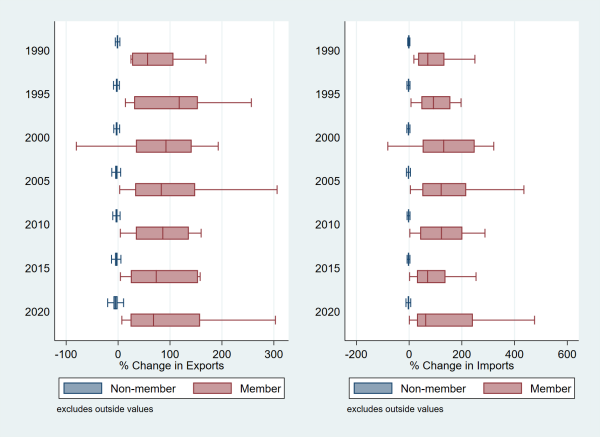


(a) 1990 (b) 2000

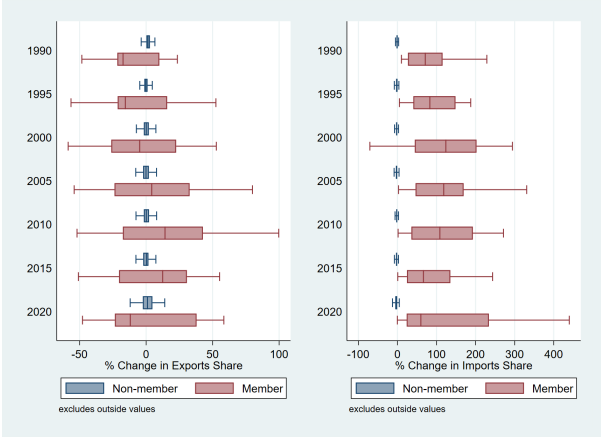
(c) 2010 (d) 2020

Figure A.3: Economy-level Ex-post Effects of APEC on Real Income under $\sigma = 5$ and $\theta = 10$

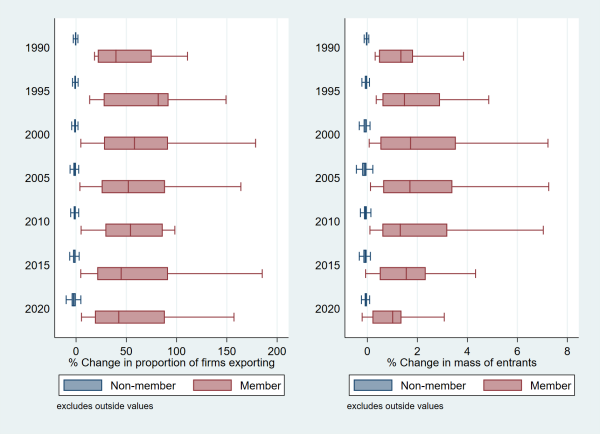
Notes: Each panel shows the economy-level ex-post percentage change in real income in the indicated year, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. The results are based on the alternative parameter values $\sigma = 5$ and $\theta = 10$. Positive values indicate that APEC increases real income relative to the no-APEC counterfactual, while negative values indicate income losses. The figure includes both APEC members and non-members and therefore captures both direct effects and general-equilibrium spillovers.



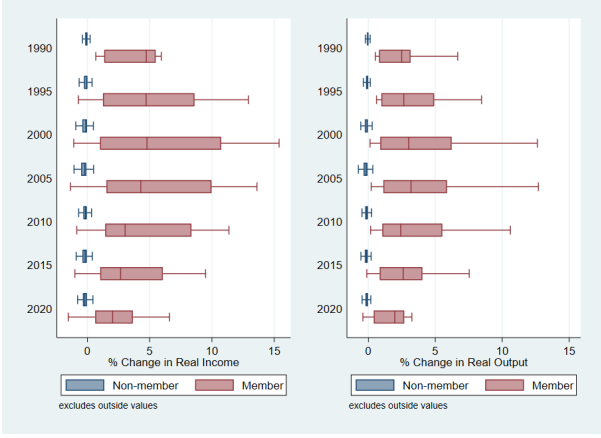
(a) Trade values



(b) Trade shares



(c) Exporting participation and mass of entrants



(d) Welfare

Figure A.4: Distribution of Economy-level Ex-post Effects of APEC under $\sigma = 5$ and $\theta = 10$

Notes: The figure reports the distribution of economy-level ex-post effects of APEC under $\sigma = 5$ and $\theta = 10$, measured relative to the no-APEC counterfactual. Each panel summarizes the percentage effect computed as $100 \times \frac{\text{With APEC} - \text{No APEC}}{\text{No APEC}}$. Panel (a) reports the effects on trade values, including exports and imports. Panel (b) reports the effects on trade shares, including the export share in total production and the import share in total expenditure. Panel (c) reports the effects on the mass of entrants and the proportion of firms exporting. Panel (d) reports the effects on welfare. The figure includes both APEC members and non-members and therefore reflects both direct effects on member economies and general-equilibrium spillover effects on non-member economies.

Table A.6: Economy-level Effects of APEC in 1990 Relative to the No-APEC Counterfactual ($\sigma = 5$, $\theta = 10$)

Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	0.71	1.13	45.96	45.66	0.41	34.00	-19.61	40.36
BRN	1	5.28	19.56	28.06	142.87	3.04	22.10	-30.59	107.78
CAN	1	2.43	3.86	111.53	134.18	1.41	73.66	-48.32	115.70
IDN	1	2.82	5.43	101.58	249.57	1.64	76.79	-21.68	228.79
JPN	1	0.66	0.80	67.56	94.90	0.38	45.36	7.20	93.94
KOR	1	3.18	5.07	144.34	133.38	1.84	88.95	20.14	129.55
MYS	1	2.55	4.78	25.55	33.75	1.23	21.18	-18.10	26.09
NZL	1	0.89	1.57	24.73	28.99	0.52	19.77	-16.58	24.22
PHL	1	3.12	5.54	169.08	123.20	1.81	110.90	12.69	115.28
SGP	1	6.67	5.93	25.96	18.04	3.85	18.36	-13.81	10.17
THA	1	2.19	4.68	36.18	34.80	1.27	31.46	-21.59	27.67
USA	1	0.52	0.67	73.40	46.77	0.31	46.44	23.50	48.29
BRA	0	-0.03	-0.06	-1.34	-2.24	-0.02	-0.10	0.82	-1.86
DEU	0	-0.03	-0.04	-0.82	-0.93	-0.02	-0.25	1.57	-0.85
FRA	0	-0.01	-0.01	-0.37	-0.35	0.00	0.02	1.07	-0.25
GBR	0	-0.04	-0.06	-1.23	-0.95	-0.02	-0.32	0.60	-0.96
IND	0	-0.07	-0.18	-2.77	-3.73	-0.04	-1.06	4.50	-3.67

Notes: The table reports the economy-level percentage effects of APEC in 1990, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table A.7: Economy-level Effects of APEC in 2000 Relative to the No-APEC Counterfactual ($\sigma = 5$, $\theta = 10$)

Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	1.77	2.26	168.46	125.21	1.03	104.07	29.45	124.94
BRN	1	10.99	46.91	57.27	1696.37	6.31	31.98	-1.19	1284.59
CAN	1	5.27	6.00	330.33	587.59	2.93	178.60	-24.69	526.73
CHL	1	1.09	1.73	27.12	34.66	0.64	23.69	-28.81	29.67
CHN	1	1.44	3.57	21.70	69.12	0.85	21.11	-33.38	59.15
HKG	1	0.13	-1.10	18.08	4.56	0.07	18.85	-19.27	2.52
IDN	1	3.43	6.46	61.50	321.05	2.00	49.33	-26.03	294.24
JPN	1	0.91	1.04	102.86	176.37	0.53	68.44	15.69	173.16
KOR	1	4.06	6.11	106.81	127.28	2.36	70.43	9.55	122.70
MEX	1	4.41	7.95	192.85	194.21	2.39	116.76	-58.62	161.17
MYS	1	23.91	61.52	94.64	318.62	13.40	52.64	13.91	231.43
NZL	1	2.60	2.90	149.88	163.37	1.46	94.15	4.68	157.64
PER	1	0.64	0.97	41.76	33.59	0.37	34.72	-26.37	29.45
PHL	1	7.17	11.78	109.55	303.03	4.15	71.92	44.53	269.33
PNG	1	4.85	10.52	47.21	135.04	2.82	34.29	-47.67	109.42
RUS	1	0.33	0.83	3.33	11.73	0.19	4.75	-8.50	10.42
SGP	1	12.62	10.95	133.47	70.00	7.23	88.70	52.79	62.63
THA	1	7.91	15.39	89.73	192.49	4.57	63.59	-11.91	168.75
USA	1	0.88	0.99	159.07	68.06	0.51	101.25	40.89	69.21
VNM	1	-28.13	-34.63	-80.41	-80.80	-17.63	5.10	489.25	-70.65
BRA	0	-0.06	-0.10	-2.64	-2.90	-0.03	-0.34	3.23	-2.49
DEU	0	-0.11	-0.13	-2.50	-2.68	-0.07	-0.82	0.21	-2.29
FRA	0	-0.07	-0.06	-2.25	-1.99	-0.04	-0.73	-0.28	-1.56
GBR	0	-0.11	-0.11	-3.56	-3.05	-0.07	-1.48	0.43	-2.60
IND	0	-0.13	-0.30	-4.39	-6.68	-0.08	-1.33	3.86	-6.07

Notes: The table reports the economy-level percentage effects of APEC in 2000, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table A.8: Economy-level Effects of APEC in 2010 Relative to the No-APEC Counterfactual ($\sigma = 5$, $\theta = 10$)

Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	1.94	2.10	144.19	144.47	1.17	85.28	50.26	142.22
BRN	1	8.37	34.57	48.08	1766.67	4.81	30.42	49.86	1371.82
CAN	1	3.31	3.48	335.14	241.77	1.93	182.23	12.89	230.03
CHL	1	1.10	1.48	23.14	30.57	0.64	20.98	-19.01	25.93
CHN	1	1.00	1.80	24.82	46.75	0.56	20.91	-18.99	41.46
HKG	1	0.17	-0.85	18.39	2.71	0.10	15.62	-2.69	1.65
IDN	1	2.22	2.63	133.61	287.70	1.26	86.23	42.18	271.21
JPN	1	1.25	1.39	105.05	125.07	0.73	64.58	31.16	124.57
KOR	1	4.84	7.51	78.10	102.53	2.81	46.41	16.06	97.59
MEX	1	3.54	5.24	123.51	141.17	1.98	87.40	-51.96	119.49
MYS	1	12.33	22.49	79.06	271.86	7.04	47.36	14.62	226.87
NZL	1	2.22	2.36	159.92	162.24	1.29	98.29	14.47	159.02
PER	1	0.79	0.99	30.47	30.78	0.45	27.92	-24.39	26.63
PHL	1	3.81	4.85	127.31	260.51	2.21	79.03	99.73	245.46
PNG	1	6.21	10.77	63.00	120.15	3.59	45.05	-44.49	95.68
RUS	1	0.25	0.60	4.31	8.93	0.15	5.00	-7.70	7.87
SGP	1	10.61	9.19	138.74	72.55	6.08	86.32	43.26	65.25
THA	1	7.14	11.37	93.17	158.67	4.12	60.94	13.95	141.55
USA	1	0.88	1.07	154.78	59.03	0.51	93.38	51.71	62.24
VNM	1	2.62	3.42	37.92	37.25	1.34	31.86	-15.94	29.91
BRA	0	-0.04	-0.05	-1.95	-2.27	-0.02	-0.28	-2.96	-2.21
DEU	0	-0.15	-0.18	-2.16	-2.52	-0.09	-0.81	0.47	-2.43
FRA	0	-0.08	-0.08	-2.53	-2.17	-0.05	-1.07	0.13	-1.98
GBR	0	-0.14	-0.14	-4.94	-3.60	-0.08	-2.40	0.82	-3.30
IND	0	-0.11	-0.15	-4.95	-3.55	-0.06	-2.07	-0.02	-3.31

Notes: The table reports the economy-level percentage effects of APEC in 2010, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table A.9: Economy-level Effects of APEC in 2020 Relative to the No-APEC Counterfactual ($\sigma = 5$, $\theta = 10$)

Economy	**APEC**	Y/P	I/P	*Exports*	*Imports*	N	V_{export}	π_{ex}	π_{im}
AUS	1	1.67	1.66	105.89	247.23	0.85	63.10	33.31	238.32
CAN	1	6.15	6.59	302.96	475.73	3.08	157.12	-18.82	439.80
CHL	1	2.65	3.75	23.06	31.71	1.34	17.84	-27.27	24.73
CHN	1	0.33	0.62	24.93	58.53	0.17	19.67	-22.31	53.05
HKG	1	-0.41	-1.54	7.65	0.79	-0.21	7.21	-14.46	-0.33
JPN	1	3.25	3.55	136.54	183.12	2.27	75.69	42.60	182.50
NZL	1	1.91	1.95	124.71	236.16	1.00	75.10	10.89	229.62
PER	1	2.04	2.11	27.46	28.22	1.37	21.91	-24.66	22.46
PHL	1	2.70	2.90	179.14	281.42	1.36	100.97	54.60	275.13
PNG	1	2.04	3.96	30.60	63.97	1.03	21.32	-47.84	52.96
RUS	1	0.21	0.40	7.26	10.50	0.10	5.41	-9.34	8.07
USA	1	0.48	0.64	187.95	61.92	0.24	110.72	58.44	66.79
BRA	0	0.01	0.06	0.31	0.48	0.00	1.49	-1.29	-0.17
FRA	0	-0.11	-0.14	-5.00	-5.09	-0.06	-2.00	6.65	-5.02
GBR	0	-0.17	-0.20	-11.20	-7.60	-0.09	-5.70	-0.24	-7.54
IND	0	-0.19	-0.30	-11.70	-12.81	-0.09	-5.70	5.39	-12.61

Notes: The table reports the economy-level percentage effects of APEC in 2020, computed as $100 \times (\text{With APEC} - \text{No APEC})/\text{No APEC}$. Results are shown for both APEC members and non-members. Specifically, the table reports the percentage changes in real output (Y/P), real income (I/P), exports, imports, the mass of entrants (N), the proportion of firms exporting (V_{export}), the export share in total production (π_{export}), and the import share in total expenditure (π_{import}).

Table A.10: Ex-post Effects of APEC on Global Income Disparity ($\sigma = 5$, $\theta = 10$)

	Gini coefficient: Nominal GDP		**Gini coefficient: Real GDP**	
Year	**Factual w/ APEC**	**Counterfactual w/o APEC**	**Factual w/ APEC**	**Counterfactual w/o APEC**
1988	0.6991	0.6991	0.7235	0.7235
1989	0.6945	0.6945	0.7248	0.7248
1990	0.7055	0.7074	0.7228	0.7224
1991	0.7122	0.7143	0.7209	0.7206
1992	0.7272	0.7323	0.7116	0.7124
1993	0.7224	0.7274	0.7056	0.7068
1994	0.7132	0.7142	0.7050	0.7058
1995	0.7038	0.7093	0.7023	0.7028
1996	0.6946	0.7002	0.6998	0.7005
1997	0.6901	0.6959	0.6988	0.6996
1998	0.7068	0.7114	0.6989	0.7001
1999	0.7084	0.7134	0.6988	0.6992
2000	0.7135	0.7187	0.6981	0.6985
2001	0.7177	0.7225	0.6957	0.6953
2002	0.7086	0.7127	0.6917	0.6905
2003	0.6902	0.6950	0.6874	0.6883
2004	0.6866	0.6930	0.6826	0.6839
2005	0.6761	0.6825	0.6775	0.6790
2006	0.6628	0.6685	0.6713	0.6724
2007	0.6371	0.6405	0.6645	0.6653
2008	0.6328	0.6354	0.6572	0.6581
2009	0.6320	0.6338	0.6462	0.6466
2010	0.6168	0.6181	0.6408	0.6411
2011	0.6206	0.6214	0.6364	0.6366
2012	0.6306	0.6312	0.6338	0.6335
2013	0.6386	0.6393	0.6298	0.6296
2014	0.6433	0.6444	0.6272	0.6268
2015	0.6505	0.6518	0.6256	0.6252
2016	0.6218	0.6232	0.6213	0.6202
2017	0.6322	0.6335	0.6211	0.6199
2018	0.6331	0.6347	0.6178	0.6159
2019	0.6444	0.6458	0.6164	0.6150
2020	0.6379	0.6392	0.6171	0.6158

Notes: The table reports the Gini coefficients of cross-country income under the factual equilibrium with APEC and the counterfactual equilibrium without APEC for each year from 1988 to 2020. The first two columns report the Gini coefficients based on nominal GDP, and the last two columns report the Gini coefficients based on real GDP. A lower Gini coefficient indicates lower global income inequality. Differences between the factual and counterfactual values capture the ex-post effect of APEC on global income inequality..