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Online appendix to BIS Bulletin no 110: Macroeconomic impacts of tariffs and policy uncertainty

Modelling the impact of tariffs on GDP growth is a complex task. Ultimately, any trade model is only a stylised representation of how much and how fast individual consumers, producers (for intermediate and final consumption goods), retailers and countries will react to changes in trade policies and the effects that these changes induce on key variables, such as the exchange rate.

Trade policy modelling involves important choices about the method used (eg global vector autoregression, computable general equilibrium (CGE) or dynamic stochastic general equilibrium (DSGE)) and the channels of transmission that are accounted for. Estimated effects may also be influenced by the market structure that prevails or is assumed to prevail in the intermediate and final goods sector. This is because the degree of competition in each market determines the extent to which companies can accommodate changes in trade policies by compressing their markups to retain their market share – thus diminishing the price impacts.

Each stylised model has both advantages and, inevitably, limitations.[1] Graph 1.B in the Bulletin presents current estimates of GDP effects for a selection of models and countries. Notably, the estimates show far less dispersion across models in the case of the United States and the euro area, than in the case of Canada and Mexico – two smaller economies with intensive trade flows as well as value chain integration with the United States. Central estimates of the contractionary effects of recent changes vary between 0.6 percentage points and 1.2 percentage points in the United States, while in Mexico they range from 0.4 percentage points to 2.7 percentage points.[2]

Zhao's (forthcoming) estimates are based on a global version of the canonical general equilibrium trade policy model of Caliendo and Parro (2015). It incorporates global input-output linkages and endogenous labour supply. Countries adjust their sourcing across sectors and countries in response to changes in prices and wages. Zhao finds that the effects of tariffs on euro area output are much smaller than those elsewhere due to its limited goods trade with the United States and lower tariffs. With sharper retaliatory tariffs, GDP would fall in all economies. At the same time, retaliation would lower the inflation impact in the United States, due to this global deceleration in activity. As a granular trade model, the model does not account for responses of monetary and fiscal policies or for physical and financial capital adjustments.

[1] For instance, in most theory-based equilibrium models, trade is balanced, ie they are unable to explain persistent trade surpluses or deficits.

[2] Note that scenarios differ somewhat between models. Kalemli-Özcan et al (2025) consider all "Liberation Day" tariffs, with no retaliation. The tariffs are assumed to fade out very gradually, as the exercise is done assuming a high persistence parameter of 0.95. Similarly, Rodríguez-Clare et al (2025) consider all "Liberation Day" tariffs but assume they remain in effect until 2028. In turn, the Budget Lab at Yale considers tariffs that are effectively in place, with the actual degree of retaliation by other countries.

Comparison of trade models

Table A.1

	Model type	Intermediate goods sector?	Endogenous labour supply?	Sectoral hetero-geneity?	Monetary policy?	Fiscal policy?	Short-run vs long-run effects?
Zhao (forthcoming)	Trade model	✓	✓	✓	×	×	✓
Kalemli-Özcan et al (2025)	Trade model + DSGE	✓	✓	✓	✓	✓	✓
McKibbin et al (2024)	Large-scale CGE	✓	✓	✓	✓	✓	✓
Rodríguez-Clare et al (2025)	Trade model	✓	✓	✓	×	✓	✓
Budget Lab at Yale, Global Trade Analysis Project	Large-scale CGE	✓	✓	✓	×	✓	✓

Alternatively, the Rodríguez-Clare et al (2025) model can simulate how tariffs change employment across sectors and US states. Workers can switch sectors, subject to mobility costs. The crucial parameter in this model is the trade elasticity. When trade flows show little response to tariffs, the United States has stronger market power relative to smaller trading partners. In principle, this could allow it to have income gains when imposing tariffs, even if trading partners were to retaliate.

The McKibbin et al (2024) simulations are based on a hybrid of a CGE and a DSGE macroeconomic model, the so-called G-cubed model. Its main distinction is the rich level of institutional detail. For instance, the model features fully optimising and hand-to-mouth agents in every country as well as firms that face liquidity constraints. There are sector-specific physical capital adjustment costs. At the same time, it also incorporates the distinction between countries with a floating exchange rate regime and those with effectively pegged exchange rate regimes. Additionally, it distinguishes between countries that have internationally integrated asset markets and those with capital controls.[3]

In turn, the benefit of the global general equilibrium model of Kalemli-Özcan et al (2025) is that it incorporates the endogenous reaction of monetary policy in each country to tariffs. As in most theoretical models that feature exchange rates, this model predicts an appreciation of the dollar when tariffs are announced.[4] Indeed, such effects on the exchange rate have also been confirmed empirically (see eg Jeanne and Son (2024)) and after the first round of 2025 US tariffs. According to the calibrated model of Kalemli-Özcan et al (2025), the immediate appreciation of the US dollar would be 10% if the tariffs announced on 2 April were highly persistent and if there were no retaliation from other countries, and 4.8% with full retaliation. Increased global uncertainty would reduce this appreciation and might even reverse it. That said, uncertainty is introduced as a rather ad hoc multiplying factor on expected exchange rate variations and risk premia in the uncovered interest parity condition.

3 The 1.2 percentage point effect on US output in the McKibbin et al (2024) model was based on the assumption of a universal 10 percentage point increase in US tariffs, without retaliation, except for China, which is subject to a 32 percentage point tariff increase.

4 In the G-cubed model of McKibbin et al (2024), for instance, a universal 10% US tariff increase alone leads to a 3.1% appreciation of the US dollar in the short run, rising to 4.3% in the long run. The currencies that depreciate most after such a policy is introduced are the Mexican peso (–5.3% in the short run), the Canadian dollar (–3.6%) and the Japanese yen (–1.1%).

Finally, the Yale lab's estimates are based on the Global Trade Analysis Project (GTAP) network model (Corong et al (2017)). This large-scale CGE model has been evolving since its launch more than 30 years ago and is now in its seventh version. The model has been used for background quantitative analyses in past World Trade Organization trade agreement rounds. The standard GTAP model is based on the convenient workhorse assumptions of perfect competition and constant returns to scale. An extension module makes it possible to relax this strong assumption, allowing for more realistic imperfect competition between firms and market power.

Summing up, quantitative models are key for understanding transmission channels, assessing effects and exploring counterfactual and policy options. However, given the many interlinkages and reverberations of tariff changes through different markets, it is important to understand which channels are left out of each specification.

Finally, a caveat to bear in mind for any statistical inference at the current juncture is that recent increases in tariffs are much larger than incremental changes seen in the postwar period. At the same time, they also differ in direction, given that the postwar period was by and large characterised by a steady trend of declining tariffs on average across countries. This could matter because models that are based on past time series may fail to properly capture non-linearities or asymmetries.

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