COALITION for a PROSPEROUS AMERICA

PRO-GROWTH TARIFFS

Modified Economic Model Shows Domestic Growth

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ABSTRACT

Tariffs create space for domestic firms to increase their capacity and boost economic output. Yet, standard trade models do not incorporate the relationships that would deliver increases in capacity and output. We modify the standard Global Trade and Analysis Project (GTAP) model with productivity and factor supply elasticities to show how tariffs can increase domestic production. We introduce an increase in tariffs on Non-Free Trade Agreement countries of 35 percentage points to manufacturing sectors and 15 percentage points to agriculture and primary products to our modified model.

We find a 6.95% increase in real GDP and an increase in domestic manufacturing of 14%. Household incomes increase by about 18%, which means that tariffs expand rather than contract household incomes. Employment increases by 4.7%. Our results offer evidence that trade restriction can be a sound economic policy tool as the tariffs imposed in this model are both pro-productivity and pro-growth.

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Background

Standard models of international trade tend to show tariffs generate inflation and reduce economic growth by lowering domestic production and consumption. The standard Global Trade Analysis Project (GTAP) model was built to reflect assumptions that are path dependent, with some built-in rigidity towards the initial economic structure. For example, national prices of tradable goods are determined by world prices, unless the given country is a major player in a particular sector globally to begin with. Further, the model assumes each country is at an equilibrium that maximizes output. Modelers introduce a policy change such as a tariff increase or decrease and the model generates a new equilibrium. The model assumes factor endowments (labor, land, capital) do not change, which rules out a change of employment as a result. In such a world, prices are the most important economic drivers of other variables, including total output and wages. Low prices are generally the best way for any nation to seize a larger share of the world market, which explains why GTAP and similar models invariably lead to the conclusion that free trade is the best policy for any nation.

While these simplified assumptions allow the GTAP model to incorporate trade flows from 140+ countries in up to 65 industries, they fail to accurately reflect the real world. For a large market like the United States, national prices can and do differ substantially from world prices. In addition, imperfect competition means that prices may not react to competitive changes as expected. In oligopolistic industries, firms which are price-setters may react to a change in tariff rates by holding prices steady and varying output. Variations in output mean that employment and capacity utilization may all vary. Finally, the new equilibrium result of the model may well exist in theory, but it could take several years for the effects of the increase in tariffs to play out and for the economy to reach that new equilibrium. In the interim, the economy may be in sub-optimal and even severely sub-optimal states for lengthy periods.

There is empirical evidence that in the U.S. tariffs can stimulate production with minimal effect on prices. A recent report by the U.S. International Trade Commission shows that the 2018 imposition of the Section 232 tariffs on steel and aluminum and the Section 301 tariffs applied to many manufactured goods from China lead to an increase in domestic production and capacity utilization (USITC, 2023). Evidence from the path of economic development of other nations such as Japan, India, and Indonesia show that import restriction can stimulate domestic production, both domestic and foreign investment (including the “tariff-jumping” investments), and employment.

In this exercise, we make two major modifications to the standard GTAP model. First, we modify the factor supply elasticities for land, labor, and capital. This reflects the availability of labor and capital to move into industries that experience increasing demand. Second, we modify the model with what we refer to as tariff productivity elasticities, to allow for higher levels of output to increase productivity, i.e. output per unit of factor inputs. The variability of both of these kinds of elasticities, and their tendency to respond positively to increases in demand has been documented in reports on the U.S. and other economies.

The CPA Model Tariff Schedule

The U.S. tariff schedule is determined by treaties and our commitments to the General Agreement on Trade and Tariffs (GATT) and the World Trade Organization (WTO). When Congress grants "Normal Trade Relations" or "Most Favored Nation" status to a country, it offers the default tariff rate schedule for imports from that country.

CPA has proposed that Congress take action to raise tariff rates and adopt a "Model Tariff Schedule" (MTS) which does not violate existing agreements. Under WTO rules, the U.S. is permitted to raise its bound and applied tariffs against all countries except those with which it has bilateral a free trade agreement (FTA). Any bilateral FTA would need to be renegotiated, likely a lengthy process.

For this model, we look at the impact of a simplified Model Tariff Schedule including two tariff rates broadly applied. We model an increase in the tariff rate schedule for non-FTA countries for manufactured goods by 35 percentage points and for agricultural and primary products by 15 percentage points, with the exception of minerals where the U.S. supply is limited by nature.

The U.S. has 14 FTAs with 20 countries, of which the best known is the USMCA agreement with Canada and Mexico. We do not increase tariffs on imports from these 20 countries. In the model we divide the world into three regions: the U.S., FTA countries, and non-FTA countries. Countries categorized in the FTA region are Australia, Bahrain, Canada, Chile, Columbia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Israel, Jordan, Korea, Mexico, Morocco, Nicaragua, Oman, Panama, Peru, and Singapore.

The tariff increases in our model are outlined below in Table 1.

Table 1: Percent Increase in Tariff Rate by Sector

Sector	Products	Tariff Increase FTA	Tariff Increase NFTA
Agriculture	Vegetables, fruits, oils, dairy	0%	15%
Primary Products	Forestry, fishing, coal, oil, gas, meat products	0%	15%
Exempt Products	Minerals	0%	0%
Manufacturing	Twenty-one sectors including: chemical, metal, motor vehicles, and electronics	0%	35%
Construction	Construction and utilities	0%	0%
Services	Sixteen sectors including: restaurants, businesses, retail, and health services	0%	0%

Results

Table 2 provides a summary of the results from our model of the Model Tariff Schedule. We use the GTAP 10 database, which reflects world economy data from 2014. We scale the results of the simulation to current data as of 2022 to provide context for the scale of the results.

Table 2: Results from Simulation

Economic Indicator	Change (%)	Actual, 2022 ($ Billions)	Post-Tariff ($ Billions)	Change ($ Billions)
Real GDP	6.95%	$25,463	$27,232	+$1,770
Real Private Consumption	11.29%	$17,357	$19,317	+$1,960
Real Imports	-8.39%	$3,246	$2,974	-$272
Real Exports	-2.95%	$2,063	$2,002	-$61

Source: U.S. Bureau of Economic Analysis, U.S. Census Bureau, CPA model
Note: Figures are rounded to the nearest billion.

Our model shows that the CPA Model Tariff Schedule would increase U.S. real GDP by 6.95% or $1.77 trillion. The increase in growth is driven by the increase in output in the domestic manufacturing sector. Imports decrease as consumption shifts to goods produced domestically.

Tariffs are often thought of as inflationary because a portion of the tariff will be paid by the importer and then passed on to the consumer. Importantly, the economic literature on recent tariff increases finds that consumers have not paid higher prices for tariffed goods (Cavallo et al., 2021). Our model finds a similar result, with minor inflationary impact from the tariff increases. Consumer prices increase by a modest 0.75% annually over a six-year period from pre-tariff to post-tariff state.

In 2021, the median household income in the U.S. was $70,784. An increase of 17.6% would see incomes rise by $12,458 for the median American household to $83,242.

Employment increases by 4.7%. At current employment levels as of May 2023, employment would increase by 7.3 million jobs nationwide.

Both imports and exports fall, but imports contract more than exports, so the trade deficit shrinks. The tariffs make domestic goods more competitive in the U.S. market, so imports fall. Furthermore, resources are diverted to domestic production, driving a decrease in exports. Our results show imports fall by 8.39% or $272 billion while exports fall by 2.95% or $61 billion. In 2022, the U.S. ran a goods trade deficit of $1.183 trillion. The trade deficit would shrink by $211.5 billion to about $972 billion, a reduction of about 18%.

Growth in Economic Output

Our model finds economic output in the U.S. would grow by 7% in real terms. U.S. manufacturing output grows by 14%. All manufacturing sectors grow from the increase in productive capacity created by the tariff. The computer and electronics sector has the largest increase in output of 55.7%. Sectors with higher import penetration before the tariffs tend to show the sharpest growth after the imposition of tariffs.

The services sector also grows, by 5%, as the increased demand generated in the manufacturing sector creates more demand for services.

The implications of the modified GTAP model are clear. The introduction of factor supply elasticities and tariff productivity elasticities allow the productive resources of the economy to respond to the larger market opportunity created by the tariffs by increasing output. Rising output leads to increased employment, which increases household income. The net effect is a larger, broader-based economy.

The model simulates the movement of the economy from the pre-tariffs state to the post-tariffs state. While the model does not include time, we can presume that it would take approximately four to eight years for these effects to play out, with a midpoint of six years. Tariffs make a positive contribution to economic growth, output, employment, wages, and corporate profits.

Table 3: Change in Output by Sector

	Change in Output (%)	Output, 2014 ($ Billions)	Output, Post-Tariff ($ Billions)
Pharmaceuticals	22.9%	$121	$148
Beverages	10.6%	$118	$130
Chemical Products	13.4%	$404	$458
Computer/Electronics	55.7%	$524	$815
Electrical Equipment	2.2%	$203	$207
Ferrous Metals	3.4%	$157	$162
Food Products	8.2%	$290	$314
Leather Products	85.5%	$13	$23
Machinery	10.2%	$586	$646
Other Manufacturing	16.3%	$199	$231
Metal Products	9.5%	$319	$349
Non-Ferrous Metals	4.9%	$116	$122
Mineral Products	9.0%	$130	$142
Motor Vehicles	3.3%	$508	$524
Paper Products	4.1%	$300	$312
Petroleum/Coal	11.8%	$306	$343
Rubber & Plastic	9.3%	$238	$260
Textiles	21.1%	$129	$156
Other Transportation	4.2%	$215	$224
Apparel	35.4%	$81	$109
Wood Products	5.2%	$263	$277
Construction	2.4%	$2,301	$2,356

Exempt Products	-0.6%	$36	$36
Primary Products	-1.4%	$324	$319
Services	5.3%	$13,564	$14,286

Note: Output figures reflect 2014 levels.

Model Modifications

Tariff Productivity Elasticities

Our first contribution to modifying the standard GTAP model is the introduction of tariff productivity elasticities to the model. The standard GTAP model does not account for the productive space that tariffs allow for domestic industry to increase capacity and productivity. When output rises, output will rise by more than inputs (measured in percentages). Broadly speaking, this is due to the existence of economies of scale or spare capacity in many industries.

According to a recent report by the U.S. International Trade Commission's (USITC) analysis of the Section 232 and Section 301 tariffs, tariffs led to an increase in domestic production in several sectors. We derive our tariff productivity elasticities from the USITC report on the tariffs (USITC, 2023).

The tariff productivity elasticities by sector represent the percentage increases in productivity (which is in turn change in output when tariffs increase by one percent). We apply a tariff productivity elasticity to all manufacturing sectors in the model, based on our simulation analysis from the USITC data. The following sectors were assigned elasticities calculated directly from the findings of the ITC report: apparel (0.434), computer/electronics (0.8), ferrous metals (0.087), non-ferrous metals (0.45), motor vehicles (0.122), and other manufacturing (0.335). For example, an elasticity of 0.434 in the apparel sector means that the sector can produce 0.434% more from the same inputs when tariffs increase by 1%. In effect, owing to these increases in productivity, this would lead to the sector producing more than 0.434% thereby also increasing demand for inputs. To map these findings to sectors not included in the ITC report, we assigned a production elasticity that is the average of those five sectors. The average value of 0.371 was assigned to all other manufacturing sectors.

To test the robustness of our results, a sensitivity analysis was run that varied the tariff productivity elasticities by +/- 25%. We find our results presented above to be statistically significant at the 95 percent confidence interval.

Factor Supply Elasticities

Our second modification to the standard model is to allow firms to increase their inputs of the factors of production. The standard model is subject to the limitation that the total supply of all important factors of production are fixed. Imposition of a tariff would therefore reduce output by raising costs and prices.

As discussed above, factors of production are not fixed in the real world. Increased demand in any sector can attract more factors (land, labor, capital) into the sector. The total of each factor across the entire economy can increase as factors are pulled out of unproductive use and into the productive economy.

We derive reasonable estimates for these elasticities from the economic literature. Capital is the most flexible factor, as the U.S. economy has ample resources of capital from domestic savings and foreign investment. We estimate a supply elasticity of 1.0 for capital and natural resources. Estimates of labor elasticities vary widely in the economic literature. We sought a mid-point among the estimates. We use an elasticity of 0.75 for both skilled and unskilled labor (Chetty et al., 2011). We consider land to be relatively fixed and more rigid than other inputs, and therefore assign an elasticity of zero. We assign equal elasticities among the U.S., the FTA region, and the non-FTA region.

Conclusion

Most trade modeling exercises conclude that freer trade achieved by lowering tariffs leads to increased output. We maintain that those results are dependent upon a model that restricts the major mechanisms by which increased domestic demand leads to growth in the domestic economy. We have modified the standard GTAP model by introducing the ability to produce more under higher levels of protection and the ability to expand factors of production when the returns to them are higher. The result is greater flexibility on the supply side of the economy, allowing it to respond to demand stimulus with increased production. This leads to larger output, and benefits that carry through the entire economy.

Perhaps the most encouraging part of our analysis is the differing growth rates we see in output among various manufacturing sectors. The output of sectors including computers, textiles, and machinery grow at double-digit rates. This suggests that the broad-based tariffs of the Model Tariff Schedule can produce broad-based growth across the economy. Since each of the growth sectors tend to be regionally concentrated, this growth strategy would yield growth and employment benefits in many regions of the U.S.

References

Cavallo, A., Gopinath, G., Neiman, B., & Tang, J. (2021). Tariff Pass-Through at the Border and at the Store: Evidence from US Trade Policy. American Economic Review: Insights, 3(1), 19-34.

Chetty, R., Guren, A., Manoli, D., & Weber, A. (2011). Are Micro and Macro Labor Supply Elasticities Consistent? A Review of Evidence on the Intensive and Extensive Margins. American Economic Review, 101(3), 471-475.

U.S. International Trade Commission. (2023). Economic Impact of Section 232 and 301 Tariffs on U.S. Industries. https://www.usitc.gov/publications/332/pub5405.pdf