Key Points

- Major U.S. trading partners have already indicated they might retaliate to new U.S. trade tariffs recently announced by President Trump. New tariffs could, therefore, lead to a "trade war." However, game theory also suggests that U.S. trading partners could eventually respond with "trade opening," depending on the ultimate payoffs to each party in the trading partnerships.
- We estimate that an all-out trade war would reduce GDP by 0.9 percent by 2027 and by 5.3 percent by 2040. Wages would decline by 1.1 percent by 2027 and 4.8 percent by 2040, relative to current policy. A trade opening would have the opposite effect: GDP would increase between 0.2 to 0.7 percent by 2027 and between 1.3 to 4.0 percent by 2040. Wages would increase between 0.3 to 0.8 percent by 2027 and between 1.2 - 3.6 percent by 2040, relative to current policy.
- The downside risk of a trade war, therefore, is larger than the upside potential from a trade opening.

Summary

PWBM estimates that an all-out trade war would contract the economy and reduce wages by 1.1 percent by 2027 and 4.8 percent by 2040.

The Economic Costs of a Trade War

Introduction

On Thursday, March 8, 2018, President Trump signed an order that imposes a 25 percent tariff on steel imports and a 10 percent tariff on aluminum imports, taking effect on March 23, 2018. Major U.S. trading partners have already indicated potential retaliation against U.S. action by enacting tariffs of their own, potentially leading to a "trade war."

President Trump, however, has indicated that one potential outcome of his order could be to actually reduce existing foreign tariffs against U.S. exports, thereby ultimately producing a "trade opening." Game theory does not make a clear prediction of the ultimate resolution to this "game of chicken," since the equilibrium outcome of the game depends on the *perceived* value of trade to the United States and its trading partners.

The bulk of economic literature suggests that international trade has contributed positively in the past to economic growth of trading countries by allowing trading countries to specialize more in their production of goods and services. However, for large countries like the United States, previous experience indicates the main value to U.S. consumers from increased trade likely comes more indirectly, with foreign firms reducing the market power held by domestic firms before trade. For example, foreign imports of automobiles over the past three decades substantially reduced the market share earned by domestic (the "Big Three") U.S. automakers. Due to fixed costs associated with current trading behavior, a sudden trade war could create a significant short-run disruption that is even larger than the longer-term impact from rising market power.

However, even in the long run, changes in international trade has another impact on the U.S. economy,

stemming from the "financial account" of the international balance of payments. Specifically, deficits in the "current account" (which tracks trade in goods and services) must be perfectly offset with surpluses in the "financial account" (which tracks trade in assets and liabilities). In simpler terms, the U.S. pays for its trading deficits by selling assets, including Treasury debt, to foreign countries. A trade war that effectively closes the U.S. economy, therefore, means that the U.S. Treasury must sell its debt more exclusively to U.S. households, which reduces capital available for U.S. private investment. A trade opening, however, has the opposite effect, by allowing the U.S. Treasury to sell more debt on world capital markets, thereby freeing up capital to be invested in domestic projects. The financial account channel has been largely ignored by previous studies that estimate the economic gains from increased trade.

Impact of "Trade War" and "Trade Opening" on Key Macroeconomic Variables

Table 1 shows that U.S. debt held by the public is projected to increase substantially over time under current policy, prior to the new trade tariffs. Our economic projections presented below optimistically assume that after the year 2040, the U.S. Congress stabilizes the debt-to-GDP ratio equal to its value in 2040 (shown as 1.80 in Table 1) by, hypothetically, cutting only "wasteful" government spending. Without this assumption, the U.S. economy would unravel in the Penn Wharton Budget Model at an even earlier date, due to forward-looking capital markets.

Table 1: Debt Along Current Policy

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Billions of $

	Debt Held by Public	Gross Domestic Product	Debt / GDP Ratio
2018	15,400	19,502	0.79
2027	26,000	22,778	1.14
2040	49,700	27,574	1.80

Notes: Chained 2016 dollars.

Table 2 shows the impact of an all-out trade war ("0% Open") as well as a maximum-potential trade opening ("70% Open") on major economic variables. By definition, an all-out trade war closes the U.S. economy to zero open trade. In this case, each additional dollar of Treasury debt must be financed exclusively by U.S. households, thereby diverting capital from private investments that grow the economy. In contrast, under a trade opening, the foreign uptake of U.S. Treasury debt increases from its current open value of 40 percent to around 70 percent, thereby implying that each 70 cents of each additional dollar of Treasury debt is now financed by foreign capital flows. Due to the current size of U.S. capital markets relative to the rest of the world, increasing the U.S. open value above 70 percent is not theoretically plausible, as discussed below.

Table 2: Effects of Trade on Key Macroeconomic Variables -- 0 Percent and 70 Percent Open

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	GDP (% change)		Wages (% change)		Labor Services (% change)		Capital Services (% change)	
Year	**0% Open**	**70% Open**	**0% Open**	**70% Open**	**0% Open**	**70% Open**	**0% Open**	**70% Open**
2027	-0.9%	0.7%	-1.1%	0.8%	0.1%	-0.1%	-3.0%	2.3%
2040	-5.3%	4.0%	-4.8%	3.6%	-0.5%	0.4%	-14.8%	11.1%

Note: Percentage change relative to current policy in 2027 and 2040, respectively. Under current law, the U.S. economy is modeled as 40 open, conistent with previous evidence.

As Table 2 shows, a trade war reduces GDP, wages, labor services and capital services. By 2027, we project that GDP will fall by 0.9 percent relative to current policy before President Trump's recent order. Wages fall by 1.1 percent. By 2040, we project that GDP falls by 5.3 percent and wages fall by 4.8 percent. However, a trade opening has the opposite effect. By 2027, we project that GDP will increase by 0.7 percent relative to current policy while wages increase by 0.8 percent. By 2040, we project that GDP increases by 4.0 percent and wages increase by 3.6 percent.

Sensitivity Analysis

The trade opening ("70% Open") simulation reported above, however, is likely very optimistic for estimating the potential economic benefits of trade opening. In reality, the traded U.S. capital market is currently worth much more than 30 percent of the world's traded capital market. In 2015, U.S. GDP equaled about 25 percent of World GDP using exchange rates applied to foreign exchange transactions.1 However, the U.S. stock market capitalization equaled 143 percent of U.S. GDP in 2015 using the same exchange rates, whereas the global stock market capitalization relative to world GDP---including the U.S. contribution---stood at just 55 percent. U.S. stock market capitalization is, therefore, around 63 percent of world stock market capitalization. The value of U.S. total debt securities (including financial corporate, non-financial corporate and government) is equal to about 40 percent of the world's total debt securities, whereas U.S. government debt is equal to about 37 percent of the world's government debt.

Moreover, trading markets are imperfect, even without tariffs, due to the presence of non-traded sectors as well as other frictions.2 Even with small current trading tariffs relative to historical standards, the current foreign marginal take-up rate of U.S. government bonds is about 40 percent and foreigners only own about 19 percent of U.S. equity. In contrast, the "70% Open" simulation assumes that almost 70 percent of government debt *and* 70 percent of U.S. equity will be foreign owned by 2040.3 It would take tremendous growth in the rest of the world economies relative to the United States to achieve that level of foreign ownership by 2040.

Table 3 provides additional sensitivity analysis, including the case of "50% Open." For purely illustrative purposes, we also present "100% Open" case where the U.S. is assumed to be the size of the smallest Caribbean Island (Isla Mujeres) relative to the rest of world and, therefore, completely dependent on trade. The "50% Open" case shows that the potential upside of trade openness is now quite small. GDP growth increases by just 0.2 percent (versus 0.7 percent with "70% Open") by 2027 and by 1.3 percent (versus 4.0 percent with "70% Open") by 2040. Wages increase by just 0.3 percent (versus 0.8 percent with "70% Open") by 2027 and

by 1.2 percent (versus 3.6 percent with "70% Open") by 2040. Because the "50% Open" case is likely more plausible than the "70% Open" case, the potential gains from trade opening are now substantially smaller than the potential losses from a trade war.

Table 3: Effects of Trade on Key Macroeconomic Variables -- 50 Percent and 100 Percent Open

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	GDP (% change)		Wages (% change)		Labor Services (% change)		Capital Services (% change)	
Year	**50% Open**	**100% Open**	**50% Open**	**100% Open**	**50% Open**	**100% Open**	**50% Open**	**100% Open**
2027	0.2%	1.4%	0.3%	1.6%	0.0%	-0.2%	0.8%	4.6%
2040	1.3%	8.0%	1.2%	7.2%	0.1%	0.8%	3.7%	22.3%

Note: Percentage change relative to current policy in 2027 and 2040, respectively. Under current law, the U.S. economy is modeled as 40 open, conistent with previous evidence.

Conclusion

We, therefore, estimate that the potential upside associated with a trade opening is smaller than the potential downside from a trade war. An all-out trade war would reduce GDP by 0.9 percent by 2027 and by 5.3 percent by 2040. Wages would decline by 1.1 percent by 2027 and 4.8 percent by 2040. A trade opening would increase GDP between 0.2 to 0.7 percent by 2027 and between 1.3 to 4.0 percent by 2040. Wages would increase between 0.3 to 0.8 percent by 2027 and between 1.2 to 3.6 percent by 2040.

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1. Using the purchasing power parity method, U.S. GDP is a little less than 20 percent of World GDP. But this distinction is immaterial for our purpose since we are mainly concerned with the size of the U.S. capital stock relative to GDP, both consistently measured. ↩
2. See: Obstfeld, Maurice, Kenneth Rogoff, Ben Bernanke, and Kenneth Rogoff. 2001. "The Six Major Puzzles in International Macroeconomics: Is there a Common Cause?." NBER Macroeconomics Annual 2000, 339-390. Cambridge, MA: MIT Press, 339-390. ↩
3. The foreign ownership by 2027 under this simulation is a little less than 70 percent because of the existing stock of equity and debt, which takes time to depreciate and roll over. ↩