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Tariff calculation on a beer mat

by PABLO DUARTE & AGNIESZKA GEHRINGER

Abstract

Donald Trump's "Liberation Day" has finally arrived and the details of the calculation of reciprocal tariffs have come to light. The calculation could hardly be simpler. But the economic logic behind it is flawed. As a result, Trump's intended goals are unlikely to be achieved.

Zusammenfassung

Der "Tag der Befreiung" von Donald Trump ist endlich gekommen und die Details der Berechnung der gegenseitigen Zölle haben das Tageslicht gesehen. Die Berechnung könnte kaum einfacher sein. Aber die ökonomische Logik dahinter ist fehlerhaft. Infolgedessen ist es unwahrscheinlich, dass die von Trump angestrebten Ziele erreicht werden.

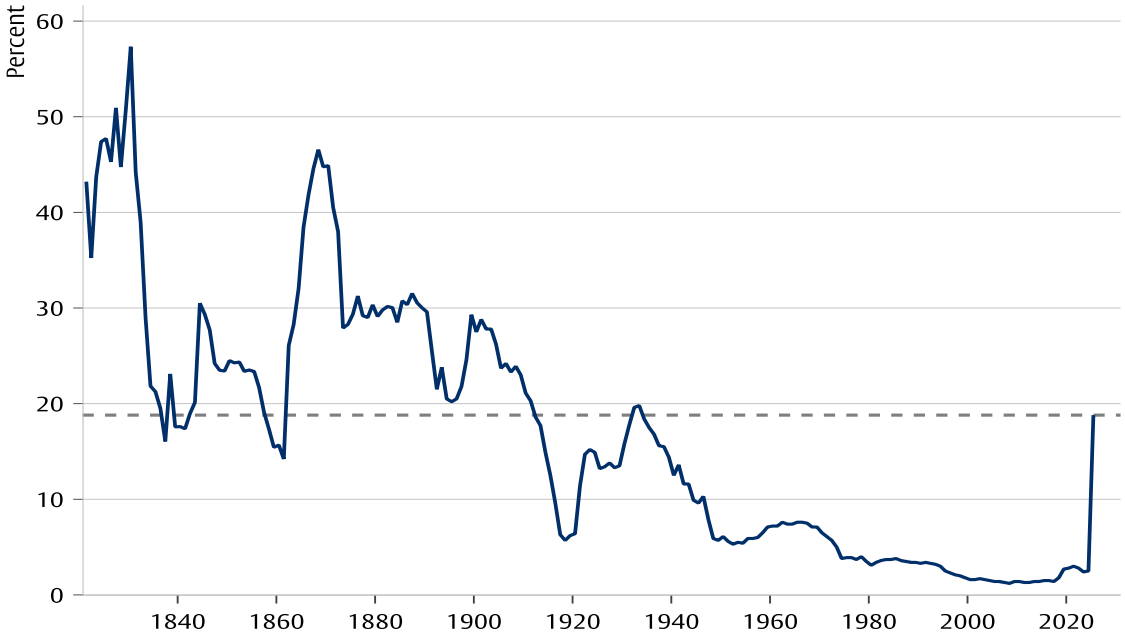
The tariff shock goes around the world

Despite many inconsistencies in Donald Trump's politics over the last decades, one thing on his agenda remains unchanged: his belief that tariffs can cure the U.S. trade deficits and boost the U.S. economy.

Surrounded by a like-minded crowd in the Rose Garden at the White House on his "Liberation Day" of April 2, 2025, President Trump announced new tariffs on a wide range of nations – friends and adversaries alike. He also introduced so-called reciprocal tariffs to match the duties that trading partners impose on U.S. exports. The underlying motivation is to end the "unfair trade practices" of foreign countries that brought "hard working American citizens (…) to sit on the sidelines as other nations got rich and powerful, much of it at our expense". With the announced tariffs, President Trump once again promised "to make America great again – greater than ever before."[1]

The announced tariffs are shocking in several ways. By imposing a minimum rate of 10% on all imports, the U.S. is bringing the average tariff rate to its highest level since the mid-1930s (**Fig. 1**). They also exceeded expectations regarding individual reciprocal tariff rates.[2]

Figure 1. Average tariff rate on U.S. imports



Source: Own elaboration based on estimations by the Tax Foundation.

[1] From the "Liberation Day" speech by Donald Trump, available at https://www.youtube.com/watch?v=rcoAYkb6gYg.

[2] The shock wave was immediately visible across financial markets. Following the announcement, U.S. Treasury yields slid, the U.S. Dollar depreciated against all major currencies and the S&P 500 finished the day 4.8% lower.

Table 1 summarizes the core information from the announcement of April 2, 2025. It shows the U.S. bilateral trade deficit with its main trading partners, the tariff rate each country allegedly imposes on American goods and the discounted reciprocal tariffs the U.S. now intends to apply. Countries with which the U.S. does not run a trade deficit, such as the UK, Australia, Brazil and Singapore (not listed in the table), will still be charged with a baseline 10% tariff.

Table 1. Tariffs implicitly charged to the U.S.A and reciprocal tariffs to countries with the largest surplus in goods trade with the U.S.

Country	Trade balance with the U.S.A, in USD bln	Tariffs charged to the U.S.A*	U.S. discounted reciprocal tariffs
China	-319.1	67%	34%
Mexico**	-175.9	--	--
Vietnam	-129.4	90%	46%
Germany***	-88.0	39%	20%
Ireland***	-87.2	39%	20%
Canada**	-72.8	--	--
Japan	-72.4	46%	24%
Rep. of Korea	-69.9	50%	25%
India	-49.5	52%	26%
Thailand	-48.3	72%	36%
Italy***	-46.0	39%	20%
Switzerland	-39.0	61%	31%
Malaysia	-26.1	47%	24%
Indonesia	-19.3	64%	32%
France***	-16.7	39%	20%
Austria***	-13.5	39%	20%
Cambodia	-13.0	97%	49%
Sweden***	-10.3	39%	20%

Notes: * As computed by the U.S. Trade Representative, including currency manipulation and all trade barriers. ** Tariff information for Mexico and Canada has not been provided since both countries are subject to tariffs as announced with separate executive orders (nr. 14193, 14194, 14197, 14198, 14227, 14231). *** Based on the announcement concerning the EU.

Source: Own representation based on Comtrade database (for trade balance) and on the announcement by Donald Trump on April 2, 2025.

Methodology behind reciprocal tariffs

According to the Office of the U.S. Trade Representative (the Office thereafter), the tariffs currently charged to the U.S. – upon accounting for currency manipulation and trade barriers – "are calculated as the tariff rate necessary to balance bilateral trade deficits between the U.S. and each of our trading partners."[3] The core assumptions of the calculation are that:

(1) "persistent trade deficits are due to a combination of tariff and non-tariff factors that prevent trade from balancing",

(2) "[t]ariffs work through direct reductions of imports",

(3) "offsetting exchange rate and general equilibrium effects are small enough to be ignored".[4]

The reasoning of the Office is simple enough to be sketched on a beer mat. A tariff increase reduces imports by an amount equal to $(\Delta\tau_i * \varepsilon * \varphi * m_i)$, where $\Delta\tau_i$ is the change in the tariff rate on country *i*, ε is the elasticity of imports with respect to import prices and φ is the passthrough from tariffs to import prices. The bilateral trade balance with country *i* (TB_i) after applying the tariff is therefore equal to U.S. exports to country *i* (x_i) minus U.S. imports from country *i* (m_i) corrected by the tariff-induced reduction of imports. In other words:

$$TB_i = x_i - m_i + \Delta\tau_i * \varepsilon * \varphi * m_i. \quad (1)$$

Accordingly, the change in tariff rate that would bring the trade balance to zero is:

$$\Delta\tau_i = -\frac{x_i - m_i}{\varepsilon * \varphi * m_i}. \quad (2)$$

Based on – albeit extremely selective – evidence from the academic literature, the Office assumes $\varepsilon = 4$ and $\varphi = 0.25$, which simplifies the change in tariff rate to:

$$\Delta\tau_i = -\frac{x_i - m_i}{m_i}. \quad (3)$$

This equation means that the change in the tariff rate that would be necessary to bring the trade balance to zero can be obtained by dividing the bilateral trade balance of the U.S. with country *i* by U.S. imports from country *i*. The Office uses equation (3) to calculate the tariffs that trading partners allegedly impose on U.S. goods (**Table 1**).

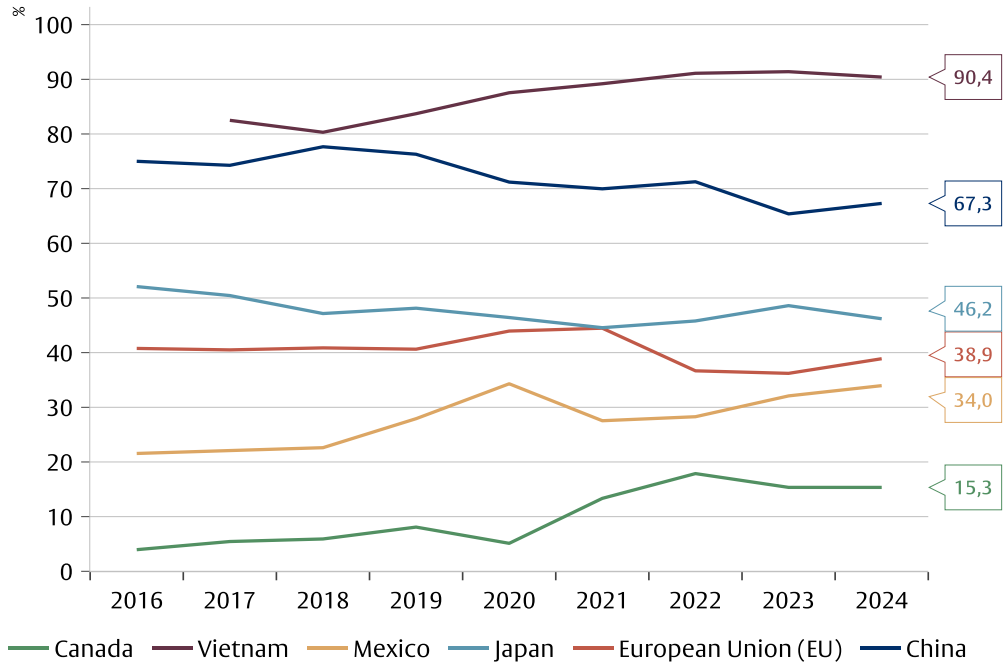
Instead, **Figure 2** shows the implied tariff rate changes on U.S. imports from its trading partners over time. Disregarding the variability over time, the Office based the calculation of the implied tariff on trade data from 2024. To "rebalance" their bilateral trade deficits, Vietnam and China would require exceptionally high tariffs – 90.4% and 67.3% – while Canada and Mexico would need much lower rates, at

[3] See the underlying explanation, available at: https://ustr.gov/issue-areas/reciprocal-tariff-calculations.
[4] ibid.

15.3% and 34%. The EU and Japan fall somewhere in between, with implied rates of 38.9% and 46.2%. Since the actually imposed reciprocal tariffs are only half of the implied rates, trade deficits could only be reduced by 50%.

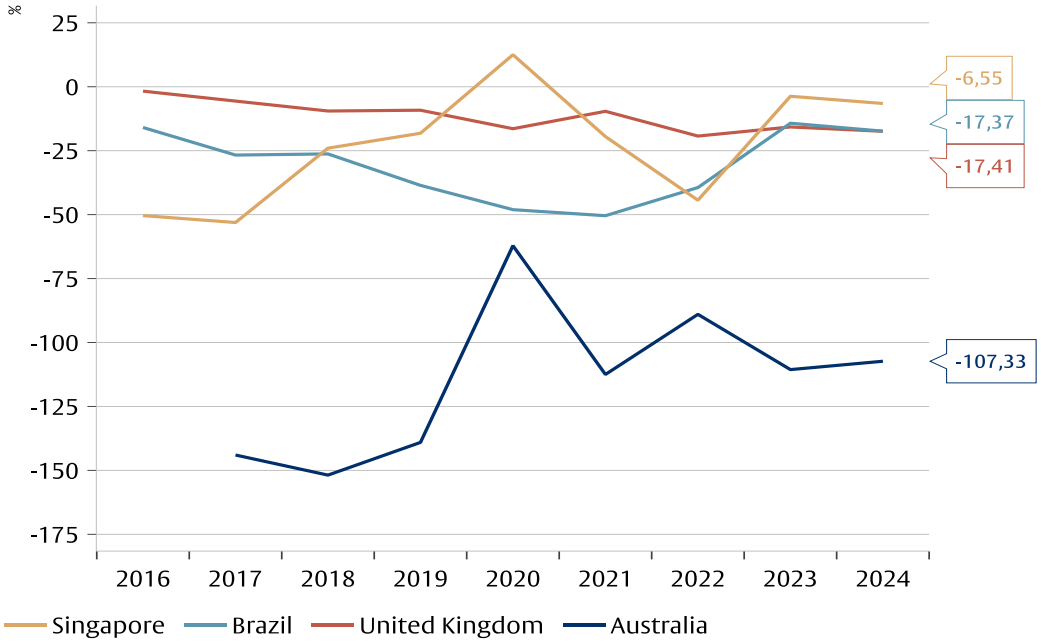
Figure 3 shows that the implied tariff rate change with respect to the UK, Australia, Brazil and Singapore has been negative for the last decade: the U.S. runs a trade surplus with these countries. Without providing much economic reasoning, the Executive Order of April 2, 2025 announcing the reciprocal tariffs states that "additional ad valorem duty on all imports from all trading partners shall start at 10 percent".

Figure 2. Implied tariff rate change on the main U.S. trading partners running a trade surplus with the U.S.



Source: Own elaboration Flossbach von Storch Research Institute, based on Macrobond and U.S. Census Bureau

Figure 3. Implied tariff rate change on the main U.S. trading partners running a trade deficit with the U.S.



Source: Own elaboration Flossbach von Storch Research Institute, based on Macrobond and U.S. Census Bureau

Reality check meets Donald Trump

Simple as it is, the reasoning behind the Office's calculation of reciprocal tariffs is economically unsound. Importantly, it is a common but flawed assumption that an increase in tariffs solely reduces imports. While tariffs will certainly raise the cost of foreign goods, thereby discouraging their consumption in the U.S., they will also trigger a range of broader economic adjustments.

First, U.S. producers of goods protected by tariffs – and there will be many – may respond by increasing prices due to reduced competition. Higher prices and limited substitutability can erode consumer purchasing power and limit overall consumption. With private consumption contributing most to U.S. economic growth in the last years, an economic slowdown with simultaneously increasing inflation would be at hand.

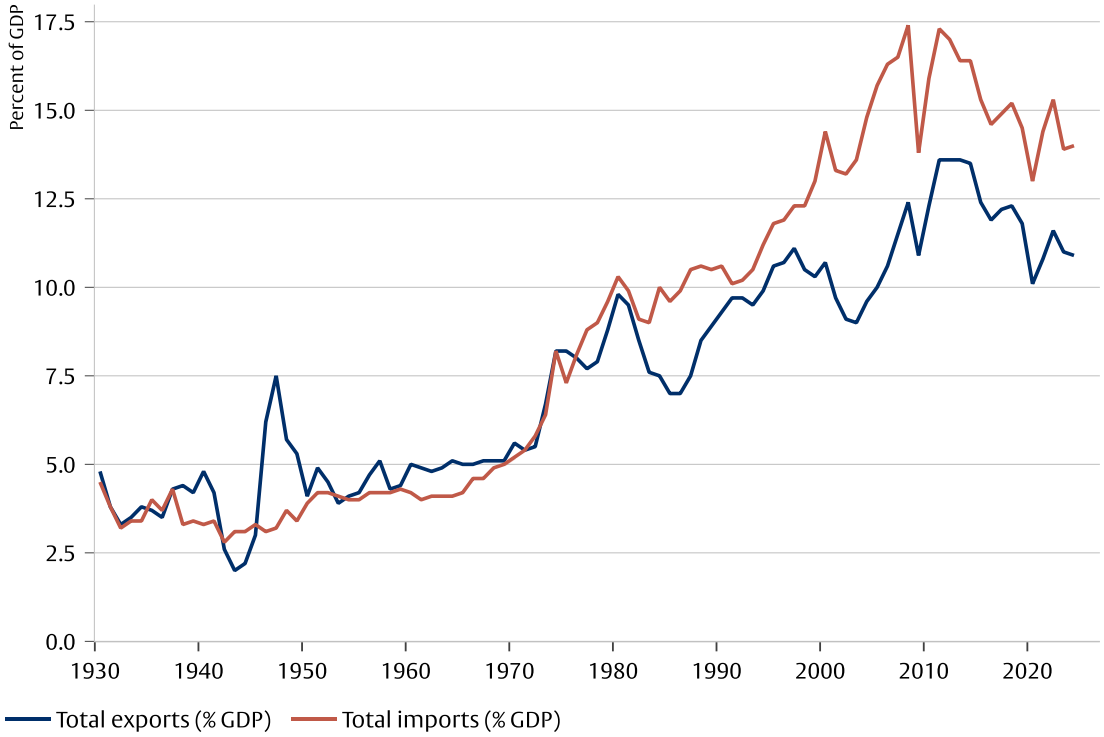
Second, U.S. firms producing for the domestic market, but sourcing their inputs from abroad will face higher input costs. Investment in domestic capacity to replace inputs from abroad would fall due to the uncertainty produced by the trade policy – against Trump's narrative. Lower growth and employment would be a more likely outcome.

Third, in preparation for "Liberation Day", U.S. trade partners have repeatedly claimed that they would not hesitate to retaliate with their own tariffs. This implies reduced U.S. exports and harm to domestic industries that rely on foreign markets.

In the worst-case scenario, a fully-fledged trade war may spark a prolonged wave of global trade instability and push the world economy into recession.

It is, moreover, misguided to assume that tariff increases will only affect imports. In practice, trade is a two-way street. A country that exports less to the U.S. earns less foreign currency and may end up buying fewer U.S. goods in return. Past evidence clearly confirms the co-movement between exports and imports (**Figure 4**). This destroys the simple arithmetic of equation (3), exposing the shaky logic of Trumponomics.

Figure 4. U.S. Exports vs Imports as percent of GDP



Source: Flossbach von Storch Research Institute, Macrobond, USITC. Data: 2024.

Conclusion

No matter how elaborate or how simple the method for calculating "fair" tariffs may be, the idea that this alone will make America great again seems far-fetched. Still, a full-blown trade war is not inevitable. Governments that understand the mutual gains from trade may keep a cool head and continue pursuing free trade agreements, despite the current U.S. administration's approach. There's even a chance that the economic pain caused by erratic tariff policy will eventually prompt a U-turn in Washington. In the best-case scenario, governments everywhere recognize how much better off they are with free trade, and the world as a whole moves towards more open markets. After all, it costs nothing to hope. And it is certainly better than sleepwalking into a protectionist nightmare.

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