Technical Appendix:
The Impact of Tariffs on Inflation

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January 31, 2025

We follow a methodology similar to Silva (2024) and Baqaee and Rubbo (2023) in mapping import prices to aggregate PCE. If we assume that wages, markups, productivity, or other intermediate input prices do not respond to import prices fluctuations, we find that, to a first-order approximation, consumer price changes follow the following equation:

$$\hat{P}^T = [\tau_M^T(\omega^M + \underbrace{B^M D(\mathbb{I} - BD)^{-1}}_{\substack{\text{Total Import} \\ \text{Requirement Matrix}}}\omega^D)]C \tag{1}$$

Here, $\hat{P}$ is a vector of log price changes of dimension $E \times 1$, where E is the number of NIPA expenditure codes (212 in our estimates).[1] τ_M is a vector of dimension $N \times 1$, where N is the number of BEA commodities (402). It denotes the weighted percentage change in the tariff of each commodity, where the weights are defined by each country market share in the BEA category. Because tariff data are at the NAICS-code level, not the BEA-commodity-code level, calculating these price changes requires the BEA-NAICS concordance table.

ω^M is a diagonal matrix $N \times N$ that gives the share of expenditure directly spent on each imported commodity (402 commodities by 402 industries in our estimates). It is calculated from the BEA's Input-Output Import Table, which includes a column that contains the personal consumption expenditure value imported for each BEA commodity. Conversely, $\omega^D = \mathbb{I} - \omega^M$ gives the share of expenditure spent on each domestically produced commodity.

The matrix B is the BEA direct domestic input coefficient matrix of dimension $N \times M$. It is defined as the domestic use table, in which each column is divided by a normalization variable that depends on our markup assumption. Under the constant-percentage markup assumption, we normalize by the sum of total intermediates and compensation of employees. Under the constant-dollar assumption, we normalize these three tables by total industry

[1] Our PCE contribution shares are year-specific, but we avoid the time subscript for simplicity.

output.[2] B^M is the BEA commodity-by-industry ($N \times M$) import input-ouput matrix representing the share of imported commodities used in each industry. It is defined by normalizing the BEA import matrix by either total industry output or total variable cost, according to whether we want to use the constant-dollar or constant-percentage markup assumption. The matrix D is the market share matrix. It is an $M \times N$ matrix calculated by normalizing the Make table by the total output of the commodity produced by each industry. The total requirement matrix is calculated as $(\mathbb{I} - BD)^{-1}$.

Finally, C is an $N \times E$ matrix that maps BEA commodities to NIPA expenditure categories, accounting for the estimated gross operating surplus of transportation, wholesale, and retail. This concordance comes from the PCE bridge file from the BEA, which decomposes the commodity composition of the PCE and adjusts producer prices to final purchaser prices. Specifically, it gives the share of each NIPA category PCE expenditure for each BEA commodity code in producer value terms and purchaser value terms. The purchasers' value sums to the aggregate PCE value. The gross operating surplus of transportation, wholesale, and retail is computed from the BEA use matrix.

References

Baqaee, David, and Elisa Rubbo. 2023. "Micro Propagation and Macro Aggregation." *Annual Review of Economics*, 15:91-123.

Silva, Alvaro. 2024. "Inflation in Disaggregated Small Open Economies."

[2]When calculating the share of consumption spent on imports (Section 1 in the main text), we use the normalization under the constant-dollar assumption.