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Profits in the "New Trade" Approach to Trade Negotiations†

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Ever since Johnson's (1954) seminal work initiated the formal analysis of trade negotiations, the terms-of-trade theory has been the dominant paradigm of the field. As is well known, it holds that trade negotiations serve to internalize terms-of-trade externalities resulting from countries' noncooperative tariff choices. Its standard formulation is due to Bagwell and Staiger (1999), who show that it can not only explain the purpose of trade negotiations but also rationalize many features of the GATT/WTO's institutional design.

For all its merits, this standard theory has two significant limitations. First, it predicts that trade negotiations should revolve solely around the issue of terms-of-trade manipulation, which seems implausible to many observers of GATT/WTO negotiations. Second, it is based on conventional neoclassical trade models, which are difficult to calibrate convincingly so that little is known about its quantitative implications for important variables such as the gains from GATT/WTO negotiations.

In this article, I present a variant of my analysis in Ossa (2011a) which aims to overcome these limitations. The main idea is to depart from the conventional neoclassical trade model and instead build on a Krugman (1980) "new trade" model. The key difference from Ossa (2011a) is that I now rule out free entry, which turns the production relocation effects into profit shifting effects. Such profit shifting effects are intuitively appealing, since they allow for a view of trade negotiations in which producer interests play a prominent role.

I keep the analysis deliberately simple to highlight the novel elements of my approach. Specifically, I shut off all terms-of-trade effects and allow trade policy to operate only at the most aggregate level so that a single tariff is assumed to apply against all imports from a given country. Naturally, these simplifications imply that the quantitative results are only illustrative. In Ossa (2011b), I have provided more definite results based on a multisector model which nests terms-of-trade, profit shifting, and political economy effects.

I. Theoretical Framework

In the interest of brevity, I focus directly on the quantitative application and do not provide any qualitative results.[1] The quantitative framework is exactly as in Ossa (2011a) with the only difference that the number of manufacturing firms is now given exogenously in all countries, and the production of each manufacturing good does not involve any fixed costs. In view of this, I provide only a brief review of the setup and refer the reader to Ossa (2011a) for additional details.

There are J countries, and consumers have access to a continuum of differentiated manufacturing goods and a single homogeneous nonmanufacturing good. The manufacturing goods are produced under Dixit and Stiglitz (1977) monopolistic competition, and international manufacturing good shipments are subject to trade costs and tariffs. The nonmanufacturing good is produced and traded under conditions which allow for the wage rate to be normalized to unity in every country.

The equilibrium of the economy can be summarized by the following conditions:

$$(1) \qquad \Pi_i = \frac{1}{\sigma} \sum_{j=1}^{J} T_{ij}$$

$$(2) \qquad G_j = \left(\sum_{i=1}^{J} n_i (p_i \theta_{ij} \tau_{ij})^{1-\sigma} \right)^{\frac{1}{1-\sigma}}$$

$$(3) \qquad X_j = L_j + \sum_{i=1}^{J} t_{ij} T_{ij} + \Pi_j - TB_j$$

$$(4) \qquad T_{ij} = n_i \tau_{ij}^{-\sigma} (p_i \theta_{ij})^{1-\sigma} G_j^{\sigma-1} \mu X_j .$$

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[1] See Mrazova (2011) for a recent theoretical treatment of the role of profit shifting effects in trade negotiations.

The first condition relates the aggregate profits in country i, Π_i, to the value of manufacturing trade flowing from country i to country j, T_{ij}, and the elasticity of substitution between manufacturing goods, σ. It captures that profits are a constant share of revenues in a constant markup environment.

The second condition is the expression for the ideal manufacturing price index G in country j, where n_i is the number of firms in country i, p_i is the f.o.b. price in country i, θ_{ij} is the iceberg trade barrier between country i and country j, and τ_{ij} is one plus the ad valorem tariff country j imposes against country i.

The third condition is the budget constraint of country j which requires expenditure, X_j, to equal the sum of labor income, L_j, tariff revenue, $\sum_{i=1}^{J} t_{ij} T_{ij}$, and profits, Π_j, adjusted for the aggregate trade surplus, TB_j, which is treated as a parameter in this static environment. Notice the shorthand $t_{ij} = \tau_{ij} - 1$.

The final condition characterizes the value of manufacturing trade flowing from country i to country j. It multiplies the number of firms in country i with the sales of an individual firm from country i to country j evaluated at f.o.b. prices. The parameter μ captures the share of income spent on manufacturing.

In combination, conditions (1)–(4) can be solved for the endogenous variables $\{\Pi_i, G_i, X_i, T_{ij}\}$ in terms of tariffs and the model parameters. Notice that n_i is a parameter by assumption, and p_i can be treated as one since wages are fixed and markups are constant in equilibrium.[2]

In principle, counterfactual effects of tariff changes can be computed directly from conditions (1)–(4). In practice, however, it is convenient to first express them in changes following Dekle, Eaton, and Kortum (2007). Denoting with a "hat" the ratio between counterfactual and factual values, this yields:

$$(5) \qquad \hat{\Pi}_i = \sum_{j=1}^{J} \alpha_{ij} \hat{T}_{ij}$$

$$(6) \qquad \hat{G}_j = \left(\sum_{i=1}^{J} \beta_{ij} (\hat{\tau}_{ij})^{1-\sigma}\right)^{\frac{1}{1-\sigma}}$$

$$(7) \qquad \hat{X}_j = \gamma_j + \sum_{i=1}^{J} \delta_{ij} t'_{ij} \hat{T}_{ij} + \varepsilon_j \hat{\Pi}_j$$

$$(8) \qquad \hat{T}_{ij} = (\hat{\tau}_{ij})^{-\sigma} (\hat{G}_j)^{\sigma-1} \hat{X}_j.$$

The new coefficients $\{\alpha_{ij}, \beta_{ij}, \gamma_j, \delta_{ij}, \varepsilon_j\}$ are simple functions of μ, factual tariffs, and factual trade flows only, which greatly reduces the number of unknown parameters.[3] Moreover, the unknown parameters are now implicitly restricted to ensure that the model perfectly matches factual trade.

II. US Optimal Tariffs

To illustrate the profit shifting rationale for unilateral protection, I begin with an analysis of US optimal tariffs. In particular, I compute the counterfactual tariffs of the United States which maximize US welfare, taking as given all other countries' factual tariffs. Welfare is simply given by real income in this model so that optimal tariffs can be found by maximizing $\hat{X}_j (\hat{G}_j)^{-\mu}$ subject to conditions (5)–(8). I use the same trade and tariff data for the year 2004 as in Ossa (2011a) and take the estimates $\mu = 0.188$ and $\sigma = 4.6$ from Dekle, Eaton, and Kortum (2007).

I find that US optimal tariffs average 21 percent and vary little across trading partners. Table 1 presents their welfare effects relative to the 2004 benchmark in percentage terms. The first column gives the overall welfare effects, $\hat{X}_j (\hat{G}_j)^{-\mu}$. The remaining columns decompose them into changes in consumer surplus, $(\hat{G}_j)^{-\mu}$, producer surplus, $\hat{\Pi}_j (\hat{G}_j)^{-\mu}$, and real tariff revenue, $\hat{R}_j (\hat{G}_j)^{-\mu}$.[4] Columns 2–4 are weighted by the share of labor income, profits, and tariff revenue in total income to ensure that they add up to column 1.[5]

As can be seen, the US gains at the expense of all other countries as a result of profit shifting effects. Intuitively, US import tariffs make

[2] Motivated by the fact that import tariffs have always been by far the most important trade policy instruments in practice, I abstract from export policy instruments. Bagwell and Staiger (forthcoming) have recently argued that this assumption is crucial to interpret profit shifting effects as a fundamental problem trade agreements are designed to solve.

[3] In particular, $\alpha_{ij} = T_{ij}/S_i$, $\beta_{ij} = (\tau_{ij} T_{ij})/(\mu X_j)$, $\gamma_j = (X_j - R_j - \Pi_j)/X_j$, $\delta_{ij} = T_{ij}/X_j$, and $\varepsilon_j = \Pi_j/X_j$, where $S_i = \sum_{j=1}^{J} T_{ij}$ are total sales, $X_j = (1/\mu) \sum_{i=1}^{J} \tau_{ij} T_{ij}$ is total expenditure, $R_j = \sum_{i=1}^{J} t_{ij} T_{ij}$ is total tariff revenue, $\Pi_i = S_i/\sigma$ are total profits, and t_{ij} and T_{ij} can be taken directly from the data.

[4] $\hat{R}_j$ is the change in nominal tariff revenue and can be computed from $\hat{R}_j = \sum_{i=1}^{J} (t_{ij} T_{ij}/R_j) \hat{t}_{ij} \hat{T}_{ij}$. Notice that $(\hat{G}_j)^{\mu}$ is the change in the aggregate price index, since the nonmanufacturing good price is unchanged.

[5] In computing the weights, I subtract the aggregate trade surplus from labor income.

Table 1—Welfare Effects of US Optimal Tariffs

	Overall welfare	Consumer surplus	Producer surplus	Tariff revenue
ROW	−0.21	0.00	−0.21	0.00
EU	−0.07	0.00	−0.07	0.00
Brazil	−0.10	0.00	−0.09	0.00
China	−0.29	0.00	−0.29	0.00
India	−0.07	0.00	−0.07	0.00
Japan	−0.08	0.00	−0.08	0.00
US	0.15	−0.45	0.31	0.29

Notes: The entries are the percentage changes in overall welfare (column 1), real labor income net of the aggregate trade surplus (column 2), real profits (column 3), and real tariff revenue (column 4) resulting from US optimal tariffs relative to the benchmark in 2004. Columns 2–4 are weighted by the share of labor income net of the aggregate trade surplus, profits, and tariff revenue in total income to ensure they add up to column 1.

Table 2—Welfare Effects of World Nash Tariffs

	Overall welfare	Consumer surplus	Producer surplus	Tariff revenue
ROW	−0.46	−0.56	−0.23	0.34
EU	−0.12	−0.33	−0.01	0.20
Brazil	−0.24	−0.17	−0.14	0.07
China	−0.79	−1.01	−0.50	0.72
India	−0.23	−0.12	−0.15	0.05
Japan	−0.20	−0.20	−0.13	0.13
US	−0.03	−0.45	0.13	0.29

Notes: The entries are the percentage changes in overall welfare (column 1), real labor income net of the aggregate trade surplus (column 2), real profits (column 3), and real tariff revenue (column 4) resulting from world Nash tariffs relative to the benchmark in 2004. Columns 2–4 are weighted by the share of labor income net of the aggregate trade surplus, profits, and tariff revenue in total income to ensure they add up to column 1.

foreign manufacturing goods more expensive in the US market so that US consumers shift expenditure towards US manufacturing goods. As a consequence, US firms sell more, which increases US profits, and foreign firms sell less, which decreases foreign profits. Since only the United States increases tariffs, consumer surplus falls and tariff revenue rises in the United States but is unchanged in all other countries.[6]

III. World Nash Tariffs

I now turn to an analysis of noncooperative trade policy which sets the stage for the later discussion of trade negotiations. Specifically, I compute the worldwide Nash tariffs, that is, the tariffs that are such that each country maximizes its welfare given all other countries' tariffs. I find the Nash equilibrium using the same algorithm as in Ossa (2011a). Specifically, I iterate across all countries' optimal tariffs until the process converges to a fixed point. I experimented with different starting values and always found identical results.

Similar to US optimal tariffs, world Nash tariffs average 21 percent with little variation across countries and trading partners. Table 2 presents their welfare effects relative to the benchmark in 2004. As can be seen, all countries lose from Nash tariffs even though the magnitudes of the losses vary somewhat. While the United States still manages to shift profits away from other countries, the resulting gain in producer surplus is much reduced. Since tariffs are now increased in all countries, consumer surplus falls and tariff revenue rises everywhere.

Intuitively, countries are stuck in a profit-shifting driven prisoner's dilemma when setting tariffs noncooperatively. Since each country attempts to shift profits away from its trading partners, no country is particularly successful, and a loss in consumer surplus is the dominating result. Interestingly, the losses in producer surplus also tend to be larger than in Table 1. The reason is that Nash tariffs increase the wedges between producer and consumer prices around the world, which reduces the share of consumer expenditure accruing to firms.

IV. Multilateral Trade Negotiations

The inefficiency of the Nash equilibrium immediately gives rise to incentives for trade negotiations. An appealing feature of the "new trade" approach presented here is that it suggests a view of trade negotiations in which producer interests play a prominent role. Not only are competing producer interests the root cause of the need for trade negotiations, but also most producers stand to benefit from a cooperative approach. This is because lower tariffs channel a larger share of consumer expenditure to producers as I discussed above.

Since the overall losses from Nash tariffs reported in Table 2 are calculated relative to the

[6] Actually, tariff revenue changes slightly also in other countries due to general equilibrium trade volume effects.

TABLE 3—WELFARE EFFECTS OF WORLDWIDE FREE TRADE

	Overall welfare	Consumer surplus	Producer surplus	Tariff revenue
ROW	−0.05	0.41	−0.08	−0.38
EU	0.08	0.06	0.08	−0.06
Brazil	−0.08	0.38	−0.15	−0.31
China	0.23	0.36	0.23	−0.36
India	−0.11	0.42	−0.20	−0.33
Japan	0.10	0.02	0.01	−0.02
US	0.04	0.08	0.04	−0.08

Notes: The entries are the percentage changes in overall welfare (column 1), real labor income net of the aggregate trade surplus (column 2), real profits (column 3), and real tariff revenue (column 4) resulting from worldwide free trade relative to the benchmark in 2004. Columns 2–4 are weighted by the share of labor income net of the aggregate trade surplus, profits, and tariff revenue in total income to ensure they add up to column 1.

benchmark in 2004, they can also be viewed as the inverse of the overall gains from trade negotiations countries have reaped by this date. Similarly, the reported effects on consumer surplus, producer surplus, and real tariff revenue can be seen as the inverse of the incidence of these overall gains on each group. As one expects, all consumers benefit, most producers benefit, and all governments lose from international trade policy cooperation.

One might think of worldwide free trade as a natural goal of future trade negotiations. To give a sense of the likelihood of this scenario, Table 3 reports the welfare effects of a complete elimination of all tariffs relative to the benchmark in 2004. As can be seen, a move to free trade would not be Pareto improving because the Rest of the World, Brazil, and India would lose as a result. The reason is simply that these countries still impose high factual tariffs so that they would have to make large concessions on their way to free trade.

V. Conclusion

The main goal of this article was to highlight two advantages of adopting a "new trade" approach to trade negotiations. First, it allows for a view of trade negotiations in which producer interests play a prominent role. And second, it lends itself naturally to quantitative analyses of noncooperative and cooperative trade policy. Let me emphasize once again that the model features many simplifying assumptions so that the quantitative results are only illustrative. I refer readers interested in a more full-fledged approach to Ossa (2011b).

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