POLITICAL AND PUBLIC FINANCE MOTIVES FOR TARIFFS*

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Abstract

Governments face many constraints when making taxation decisions, including revenue needs, political objectives, and administrative capacities. Tariffs have an appealing combination of features for politicians: they provide a stream of revenue that is easy to collect, as well as satisfying political objectives in import-competing industries. This paper describes the tax structure governments choose when they are not purely benevolent. In the model the government must finance a stream of public expenditures while simultaneously seeking campaign contributions to maximize political support. The predictions of the model are consistent with observed taxation decisions in developing and industrialized countries.

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"Whereas it is necessary for the *support of government*, for the discharge of the debts of the United States, and the encouragement and *protection of manufactures*, that duties be laid on goods, wares, and merchandise imported," From the United States Tariff Act, passed July 4, 1789 (italics added).

1. Introduction

The persistence and prevalence of tariffs, and other trade barriers, across countries and times, stands in stark contrast to basic economic intuition. This intuition has its roots in Adam Smith's "Invisible Hand Theorem" and principle of absolute advantage, and David Ricardo's law of comparative advantage. The modern world has no shortage of tariffs. They are used in both developing and industrialized nations, though much more so in the former. Governments' revealed preference for tariffs and various non-tariff barriers (NTBs) has forced researchers to reexamine potential motivations for intervening in trade, to understand both why trade barriers are so common, and why they are less so in the developed world.

The view of taxation presented here is captured in the words of two IMF researchers (Tanzi and Zee, 2000), "tax policy is often the art of the possible rather than the pursuit of the optimal." To this end, I propose a model in which a political support-maximizing government must finance a stream of government expenditures given its own limited administrative capacity. With two tax instruments available, tariffs and income taxes, the model predicts that both the tariff rate, and the proportion of government revenue coming from trade taxes, decline with income. Furthermore, the model predicts that the usefulness of tariffs does not completely disappear in rich countries—they continue to be an important source of political support, while contributing minimally to the government's revenues. Thus the model provides a single framework which explains the heavy use of tariffs in developing nations, gradual trade

liberalization as those countries become richer, and the persistence of trade barriers in wealthy nations.

The motivations for tariffs that economists have suggested fall into two general categories, both clearly articulated by the text of the Tariff Act of 1789, the first law passed by the newly created American Congress.

The first motivation explored by researchers, and suggested by America's earliest legislators, is the revenue generated by tariffs. At its inception, tariffs were the dominant source of financing for the U.S. federal government, and today trade taxes are a substantial source of government revenue in poor countries, as noted by Burgess and Stern (1993), and Rodrik (1996). The second motivation for tariffs proposed by researchers, and hinted at by the first Congress, is to gain political backing from those industries shielded from foreign competition, in other words "the encouragement and protection of manufactures." There is considerable empirical evidence that trade barriers are used to curry favor from narrow constituencies in import-competing industries. In their study of congressional lobbying Baldwin and Magee (2000) find that "campaign contributions…played a role in shaping congressional voting on trade bills in the 1990s." Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000) find that large politically organized industries benefit from more favorable trade policy in the United States. Mitra, Thomakos and Ulubasoglu (2002) find that the same favoritism prevails in Turkey. The common finding in this literature is that trade policies are systematically biased in favor of vocal industries that wield political influence through campaign contributions and reliable voting blocs.

Like the empirical researchers discussed above, economic theorists have constructed models of trade policy determination in an attempt to understand the incidence of tariffs. Once again, this research has followed two distinct tracks. The "political support" approach to

understanding trade barriers originated in Hillman (1982). This approach rationalizes trade barriers as helping incumbent politicians generate support from groups with narrow economic interests. Hillman's theory finds its intellectual descendant in Grossman and Helpman (1994). Their model improves on Hillman's by supplying microfoundations for political support: politicians either make voters better off directly by increasing their economic wellbeing, or expend campaign contributions, acquired through a *quid pro quo* with interest groups, to encourage votes through less socially beneficial channels. Grossman and Helpman's theoretical results are intuitive: organized interests use tariffs to benefit themselves at the expense of unorganized groups.

The crucial result from the public finance approach to tariffs, noted by Corden (1974, 1984), is that tariffs are efficiency-dominated by other revenue raising instruments, and will thus be absent from any optimal taxation scheme, *unless* they have a collection cost advantage over taxes with smaller deadweight losses. Despite this insight, there has been surprisingly little theoretical work connecting administrative costs to the use of tariffs. Aizenman (1987) formalizes Corden's idea by showing that tariffs will be used to raise some revenue if consumption taxes entail positive collection costs. Gardner and Kimbrough (1992) demonstrate that the evolution of taxation in the United States can be explained by a shift from tariffs to more efficient tax regimes as revenue requirements increase, making it worthwhile to adopt tax instruments with greater collection costs. Burgess and Stern (1993) note that, "different taxes make very different demands on administrative capacity"; thus the attractiveness of tariffs for some nations can be understood as a consequence of their "administrative feasibility."

Existing theoretical work on tariff determination suffers from two limitations. First, work following the political economy track has been virtually obsessed with explaining the variation

in protection across industries, ignoring the variation in tariffs across countries. Second, the two methods of explaining tariffs, political support and public finance, have remained largely disconnected in the theoretical literature.[1] Moutos (2001) explicitly argues that these are alternative approaches. On the contrary, I believe these dual explanations are complementary. The first American Congress was clearly cognizant of both benefits of import duties, and there is ample empirical evidence that both are important today. In fact, it is the finding of this paper that it is not possible to account for the behavior of tariffs, over time and across countries, without considering both motivations. Incorporating both the political and revenue functions into a theory of tariffs will help provide a better understanding of when and why governments use trade taxes, especially along the development path.

The structure of tax regimes varies greatly with the degree of economic development. It is well known that average tariff rates (measured by import duties as a percentage of the value of imports), and trade taxes (measured as a percentage of government revenue) are higher in poor countries (for an extensive survey, see Burgess and Stern, 1993). Figures 1 and 2 show scatter plots of tariff rates and import duties vs. GDP per capita, respectively.[2] Regression estimates establish a significant negative relationship between the variables. Significant higher order terms also provide evidence that the relationship between the variables is not entirely linear in character, but moderately curved. In other words, tariff rates, and the proportion of taxes coming from imports, decline *slowly* with respect to the level of national income. Regression coefficient

[1] Two exceptions are Cassing and Hillman (1985) and Mayer (2002). In a median voter model, Mayer assumes that tariffs and income taxes have symmetric collection costs. While this allows the author to explain the popularity of tariffs over production subsidies, it is inconsistent with the observation that tariffs are less common in rich countries than poor ones. The approach of Cassing and Hillman looks somewhat archaic compared to current models of endogenous trade policy. Their model, which addresses the government's choice between tariffs and quotas, is partial equilibrium and features a reduced form objective function for the government.

[2] All data are from the World Bank's World Development Indicators (2002, 2003), though the data on tariff rates were originally compiled by Rose (2002). The panel includes 136 countries of varying income levels, from 1970 to 2002.

estimates for both variables are found in the table below, and the regression curves can be seen in their respective figures.

Table 1 – Trade Taxes

Coefficient (Std. Error)	Constant	GDP	GDP^2	GDP^3
Duties/Revenue	27.2** (.488)	-.002** (.0002)	$5.29x10^{-8}$** ($1.29x10^{-8}$)	$-4.55x10^{-13}$* ($2.20x10^{-13}$)
Average Tariff Rates	21.9** (.657)	-.00236** (.00020)	$9.42x10^{-8}$** ($1.48x10^{-8}$)	$-1.27x10^{-12}$** ($3.21x10^{-13}$)

*Significant at .05 **Significant at .0001

Figure 1

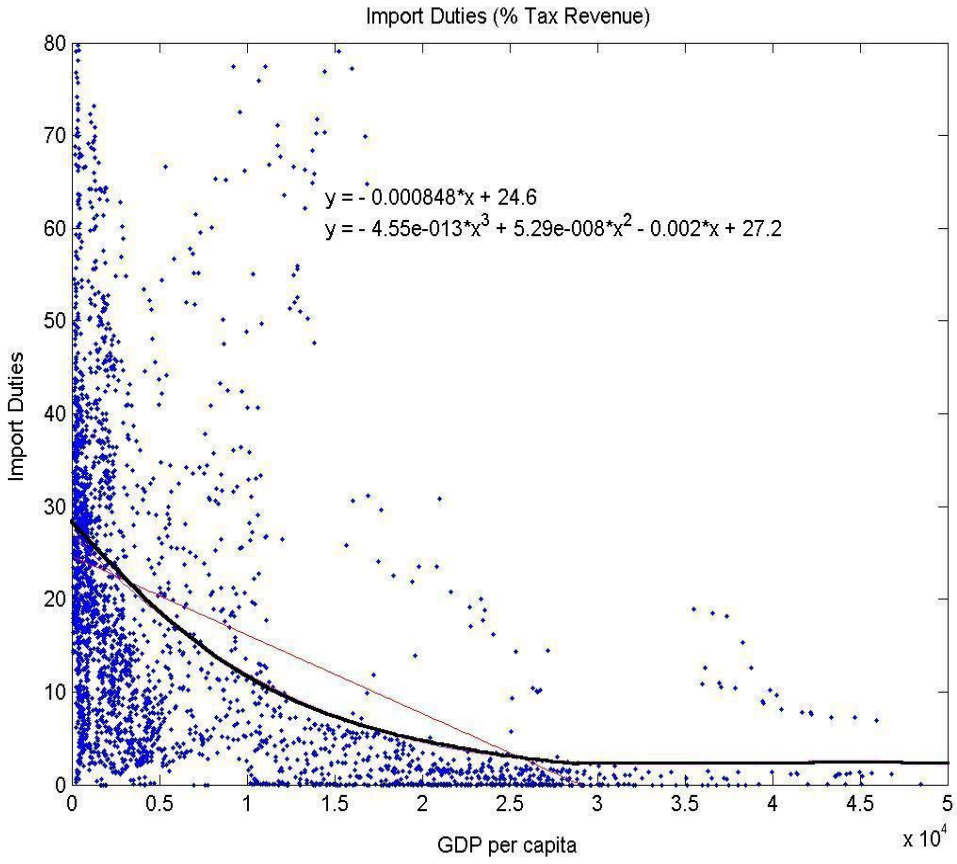
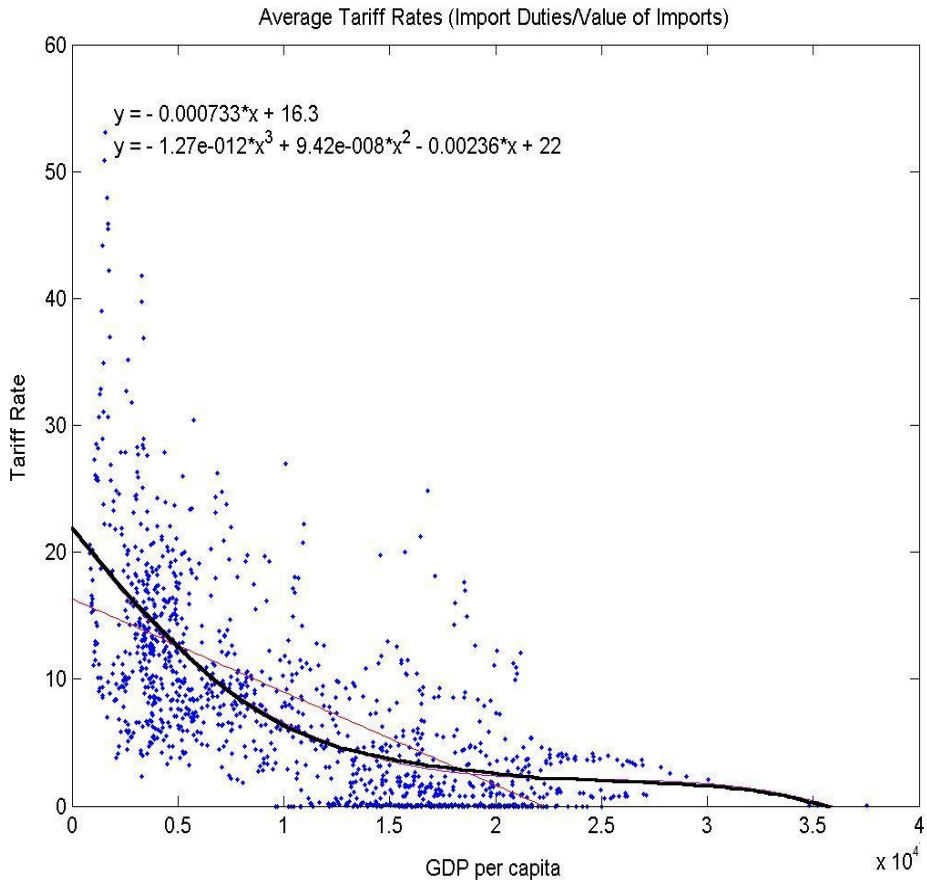


Figure 2



Taxes that are more popular in industrialized countries fall into two major categories: consumption taxes and income taxes. These tax instruments produce the great majority of tax revenues in rich countries. The importance of income taxes in particular, relative to trade taxes, is also related to the level of economic development. Figures 3 and 4 show scatter plots of income tax revenues[3] and the sum of income and excise tax revenues vs. GDP per capita, respectively. Regression estimates reveal that revenues from these types of taxes are significantly, and positively, related to income. See the table below for coefficient estimates, and the respective figures for regression lines.

[3] According to the World Bank's definition, income taxes include taxes on labor income, profits, and capital gains.

Table 2 – Income and Consumption Taxes

Coefficient (Std. Error)	Constant	GDP
Income Taxes	23.39** (.3683)	.000335** ($3.07x10^{-5}$)
Income + Consumption Taxes	49.31** (.4390)	.0003629** ($3.66x10^{-5}$)

**Significant at .0001

Figure 3

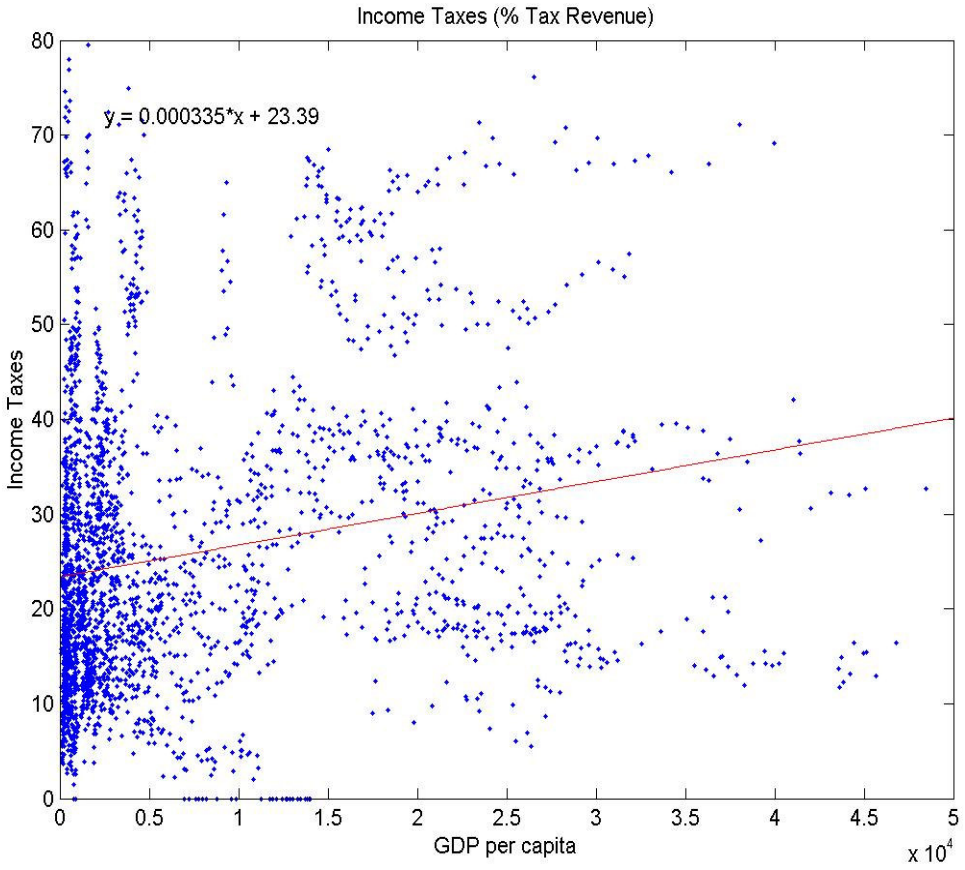
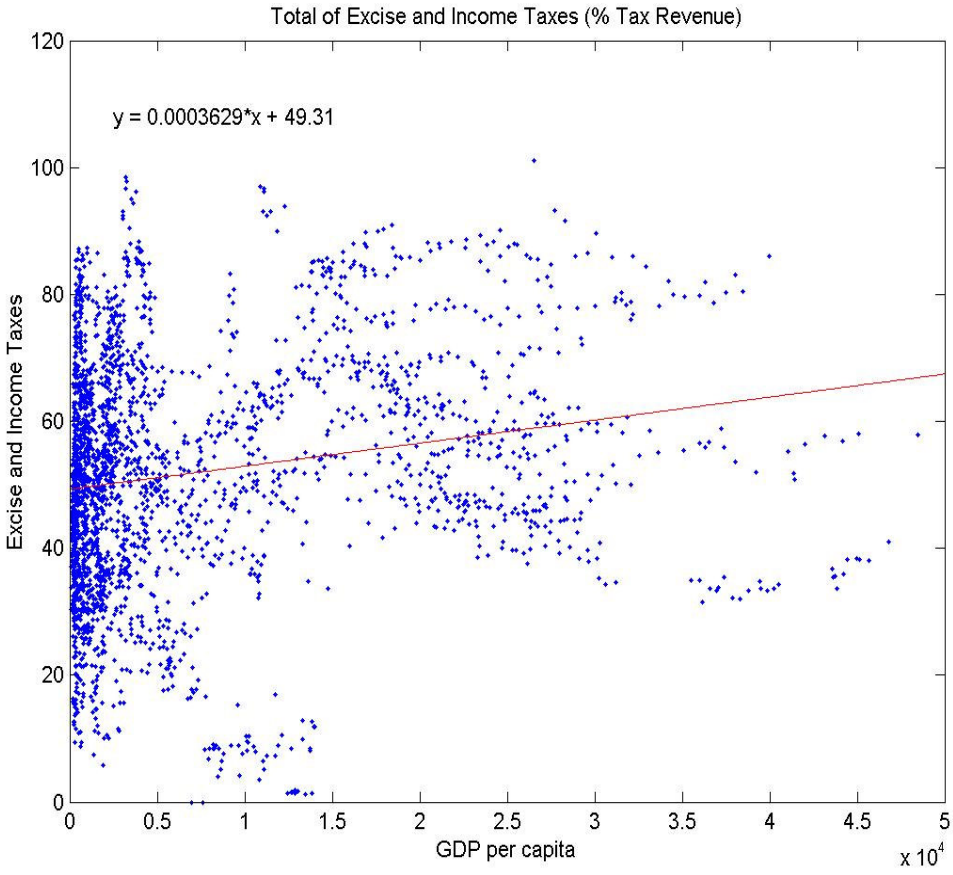


Figure 4



There is no systematic relationship between development and the use of consumption and excise taxes. Tariffs are used more in poor countries, income taxes are used more in rich countries, and consumption taxes are used in roughly the same proportion in rich and poor countries. Consumption taxes are more difficult to collect than tariffs, and can be less distortionary. The bulk of tax revenue in industrialized countries is composed of both income and consumption taxes.

Empirical evidence suggesting that political forces are important in the shaping trade policy is widespread. Gawande and Prishna (2003) provide an excellent survey, and conclude that "[r]esearchers, combining a variety of data sources and methods, have provided a

convincing confirmation of the presence and significance of political-economic influences" in the determination of trade policy. Reconciling, within a single model, the compelling evidence that both economic development and political influence are major determinants of trade policy is the aim of this chapter.

The rest of the paper is organized as follows. Section 2 presents the political economy model of tax regimes. Section 3 discusses the numerical results of the model from Section 2. Section 4 concludes.

2. Model

2.1 Structure

The present model adapts the microfoundations for political influence of Grossman and Helpman (1994) for a model of taxation with collection costs. Similar analytical approaches, focusing on the administrative costs of income and consumption taxes, which have more of an optimal taxation flavor (because they assume a benevolent government) are Aizenman (1987) and Gardner and Kimbrough (1992).[4]

The crucial actor here is the government, which maximizes a political support function that takes the utility of the representative agent, U, and campaign contributions, C, as its arguments:

$$P(U, C) \tag{1}$$

[4] The primary difference between the current approach and earlier models of collection cost motives for tariffs, aside from the addition of purely political motives, is the way in which the collection costs are modeled. Collection costs associated with advanced tax regimes implicitly grow with the scale of the economy in Aizenman (1987) and Gardner and Kimbrough (1992), though the scale of the economy is not a variable of interest the Aizenman model. Here the collection costs associated with the income tax depend on the tax rate, but not on the scale of the economy, so their size declines in relative terms as the economy grows. See below for a more complete explanation of the approach.

This objective function is a product of the politician's electoral incentives, which depend on the fact that some voters are informed and others are uninformed. Informed voters are only swayed by tangible performance, which they measure by their own utility. Uninformed or indifferent voters, on the other hand, are influenced by political advertising and encouraged to go to the polls through the expenditure of campaign contributions. This objective function captures a politician's ability to influence both kinds of voters. Denzau and Munger (1986) discuss how the political process could give rise to this sort of objective function.

The government must also finance public expenditures, G, at every point in time. There are two types of taxes available, tariffs, levied at rate τ, and income taxes, levied at rate t. G represents government spending on national defense and other market creating institutions that do not contribute directly to utility.[5]

The two tax instruments are contrasted in the following ways: tariffs are (a) very detrimental to welfare because they are highly distorting, and (b) cheap to collect (Burgess and Stern, 1993), while income taxes are (a) by assumption non-distorting (the factors of production are endowments which are supplied inelastically), and (b) require an expensive infrastructure to collect. This simple dichotomy captures key features of real-world tax regimes, and will drive the results of the model. Here, the non-distorting income tax serves as a proxy for a set of tax instruments (labor income, corporate income, capital gains, value-added taxes, sales taxes, etc.) that are more efficient, and more costly to collect, than trade taxes.

The assumption that income taxes are non-distorting is perhaps more innocuous than it seems. In a production economy, the income tax reduces the rate of return to the factors of production, and also their use if they have an opportunity cost (say, leisure). However, tariffs

[5] It is straightforward to make G endogenous if it contributes to utility. This possibility is discussed Section 4.

introduce a similar distortion by raising the overall price of consumption. If the factors of production are supplied inelastically, tariffs distort the relative price of consumption, and income taxes create no distortion. On the other hand, with endogenous income, tariffs distort the relative price of consumption and reduce the return to production, while income taxes only reduce the return to production. Because increases in the income tax rate and the tariff rate have a symmetric effect on the return to production, the additional distortion does not make either tax instrument more attractive.[6]

The government's budget constraint is

$$G + f(t) = \tau M + tI \qquad (2)$$

where $f(t)$ is the administrative cost associated with income tax rate t, I is national income, and M is the value of imports. G is a constant fraction of income such that $G = \gamma I$.

Administrative costs are modeled as a function of the tax rate. Higher tax rates are associated with higher enforcement costs because (a) they expand the proportion of the population that it is profitable to levy taxes on, and (b) higher tax rates increase incentives for tax evasion (Clotfelter, 1983). For very low tax rates, it only makes sense to pursue wealthy individuals and the largest corporations—the number of individuals taxed is relatively small, as is the cost of collection. Higher tax rates expand the number of individuals and businesses that would contribute a meaningful amount to tax receipts, hence increasing enforcement and bureaucratic costs. Increased tax evasion at higher tax rates also increases enforcement costs. This implies that $f'(t) > 0$.[7]

[6] Unreported simulations confirm that introducing this additional distortion has a negligible impact on the economy.
[7] As long as collecting income taxes entails some variable costs, in addition to any fixed administrative costs, the total cost of tax collection will be increasing in the tax rate for any non-uniform distribution of income.

It may seem intuitive to model collection costs as proportional to total income tax revenues. Unfortunately, this would be inconsistent with a number of empirical realities. First, the collection costs associated with income taxation are known to be more burdensome for poor countries (e.g. Burgess and Stern, 1993, Kenny and Toma, 1997, Kubota, 2000, Yeşin, 2004), so even if collection costs are an increasing function of revenue, they must grow more slowly than the tax base. Second, cross-sectional data indicate that collection costs per capita can be lower for rich countries, despite dramatically higher revenues.[8,9]

There is an import-competing sector of the economy that would benefit from tariffs. Independent of the specification of this sector, there will be some willingness to pay for tariffs. This willingness to pay can be thought of as a "demand for protection" (or equivalently, a "supply of campaign contributions") and characterized as a function

$$C = C(\tau) \tag{3}$$

where C is the amount of campaign contributions the firm is willing to pay for tariff level τ, such that $C'(\tau) > 0$.[10] In other words, the contribution schedule is an increasing function of the degree of protection afforded, whether this protection is created by tariffs or other types of trade barriers. This technique of quantifying political support was popularized by Grossman and Helpman (1994).

[8] Some examples of collection costs per capita: Japan (2001) $45.67, Turkey (1996) $54.04, USA (1997) $25.93, Australia (1999-2000) $154. Sources: CIA World Factbook, Department of Finance and Administration of Australia, Ministry of Finance of Turkey, United States Internal Revenue Service, National Tax Agency of Japan. Calculations are the author's.

[9] Analytically speaking, if collection costs also depend on income or revenue, the elasticity of collection costs must be less than one to be consistent with the anecdotal evidence that these costs are more burdensome for poor countries.

[10] By assuming the firm donates its entire willingness to pay, the calibrated model will *understate* the importance of political motives in the government's objective function because it *overstates* the level of campaign contributions received by the government. Given that it is the ultimate finding of this paper that political motives are necessary to explain the government's choice of tariffs, this understatement actually strengthens the conclusion.

The import-competing firm lobbies the government for protection, and makes its contribution schedule known. The government views the contribution schedule as a set of contingencies that will occur based on its choice of the tariff rate, and chooses the tariff rate to maximize its political support given the contribution schedule.[11]

So the government's objective becomes

$$P[U, C(\tau)] \tag{4}$$

Within the two sector economy, there is a representative consumer that takes τ, t, p_x, and p_y as given[12], owns the economy's factors of production and maximizes

$$U(X, Y) \tag{5}$$

The solution to the consumer's maximization problem provides an indirect utility function

$$U(\tau, t) \tag{6}$$

And an import function

$$M(\tau, t) \tag{7}$$

Equations (6) and (4) imply that the government's problem becomes maximizing

$$P[U(\tau, t), C(\tau)] \tag{8}$$

choosing $\{\tau, t\}$, subject to

$$\gamma I + f(t) = \tau M(\tau, t) + tI \tag{9}$$

This is the basic structure of the model.

[11] This timing assumption, while common, is problematic in the sense that it is time inconsistent. Fortunately, the framework can be rationalized in the context of a repeated game. In the most reasonable setting the interaction of the government and lobbyists is modeled as a repeated game with uncertain duration, where the chance of the politician remaining in power depends on the level of political support. See Hoffman (2005) for more details.

[12] For the latter variables, this is, equivalently, the assumption that the economy is small. The model, therefore, abstracts from the government's incentive to improve the terms of trade through the use of an optimum tariff. This implies that the model is not perfectly applicable to the small subset of the largest nations and trading blocs for whom the optimum tariff is a reasonable target.

2.2 Specification

In this section I adopt a specification for the model that is analytically appealing, and amenable to a numerical solution.

The government's objective function is Cobb-Douglas:

$$P(U,C) = U^{\beta} C^{1-\beta} \tag{10}$$

The lower β is, the more useful campaign contributions are in satisfying political objectives. Higher β corresponds to a more benevolent government, and $\beta = 1$ is the standard utility-maximizing government.

The production side of the economy is a two-sector specific factors model.[13] The consumer has endowments of labor, $\overline{L}$, which is mobile between sectors, capital specific to the X sector (which is by assumption the import-competing sector), $\overline{K}_x$, and capital specific to the Y sector (by elimination the export sector), $\overline{K}_y$. The production functions are given by

$$x = AK_x^{\eta} L_x^{1-\eta} \tag{11}$$

$$y = BK_y^{\eta} L_y^{1-\eta} \tag{12}$$

The import-competing and export firms maximize the following profit functions, respectively

$$\Pi_x = (1+\tau) p_x AK_x^{\eta} L_x^{1-\eta} - r_x K_x - wL_x \tag{13}$$

$$\Pi_y = p_y BK_y^{\eta} L_y^{1-\eta} - r_y K_y - wL_y \tag{14}$$

[13] The specific-factors model is the preferred framework for lobbying models of trade policy based on the observation, by Magee (1982), among others, that almost all lobbying is sector-specific in character (rather than factor-specific, as predicted by the Stolper-Samuelson Theorem).

where r_x is the rental rate on capital in the X sector, r_y is the rental rate on capital in the Y sector, and w is the wage paid to labor.

Constant returns to scale technology implies that firms producing x and y earn zero profits, regardless of prices, and thus have no incentive to lobby for changes in those prices. Lobbies in this model are associated with the sector-specific capital stocks. There are potentially countervailing forces between the owners of the capital stock in the import-competing sector and owners of the export capital stock (Findlay and Wellisz, 1982). However, I assume that only the pressure group associated with the import-competing capital is politically organized.

This is not a trivial assumption, and merits some discussion. It is related to an empirical puzzle, noted by Rodrik (1996), "there is no country that I am aware of where the net effect of commercial policies is to expand rather than contract trade." This is a puzzle because export sectors are almost universally larger than import-competing sectors. Rodrik again,

> if comparative advantage carries any force, countries will tend to specialize in their export sectors; that is, they will have larger export sectors than import-competing sectors. The unfortunate implication of this is that we should observe a bias toward export subsidies, and not import tariffs! Indeed, Levy [1999] has shown that in a symmetric Grossman-Helpman world the effect of lobbying is to encourage net trade promotion. Hence, the Grossman-Helpman framework not only does not help out with the puzzle, it actually makes it worse.

Mayer (2002) is one attempt to solve this puzzle. Import-competing sectors beat exporters in the game of political influence because (a) tax collection is costly, and (b) export subsidies require additional revenue while tariffs generate revenue. So tariffs are the preferable political tool because of their revenue consequences, and the import-competing sector out-lobbies the exporters.

The puzzle may have a simpler solution. As Rodrik notes, export sectors are generally larger than import-competing sector. Olson's (1965) seminal work establishes that the free-rider problem is more challenging the more members in a group. Export sectors will have more difficulty overcoming the problem of collective action if firms in the import-competing and export sectors are of similar size, implying a greater number of firms in the export sector. If import-competing sectors find it easier to organize and become politically active, it is unsurprising that they always win the influence game. Given these empirical and theoretical observations, it seems quite natural to assume that the export sector is unorganized, and therefore does not counter-lobby.

The returns to capital in the import-competing sector, and export sector, respectively, are

$$\pi_x = \overline{K}_x r_x - C \tag{15}$$

$$\pi_y = \overline{K}_y r_y \tag{16}$$

where C is campaign contributions to the government, given in exchange for protection in the form of tariffs.

The first order conditions of the firms imply that

$$(1+\tau) p_x \eta A K_x^{\eta-1} L_x^{1-\eta} = r_x \tag{17}$$

$$p_y \eta B K_y^{\eta-1} L_y^{1-\eta} = r_y \tag{18}$$

$$(1+\tau) p_x (1-\eta) A K_x^{\eta} L_x^{-\eta} = w = p_y (1-\eta) B K_y^{\eta} L_y^{-\eta} \tag{19}$$

Market clearing implies

$$K_x = \overline{K}_x \tag{20}$$

$$K_y = \overline{K}_y \tag{21}$$

$$L_x + L_y = \bar{L} \tag{22}$$

From equations (19)-(22), equilibrium labor supply is

$$L_x = \bar{L}\frac{\left((1+\tau)\theta\right)^{1/\eta}}{1+\left((1+\tau)\theta\right)^{1/\eta}} \tag{23}$$

$$L_y = \bar{L}\frac{1}{1+\left((1+\tau)\theta\right)^{1/\eta}} \tag{24}$$

where $\theta = \left(\frac{p_x}{p_y}\right)\left(\frac{A}{B}\right)\left(\frac{\bar{K}_x}{\bar{K}_y}\right)^{\eta}$.

Campaign contributions are the willingness to pay for tariffs; therefore, based on equations (15), (17), and (23)

$$C(\tau) = \bar{K}_x\left[r_x(\tau) - r_x(\tau=0)\right] = p_x\eta A\bar{K}_x^{\eta}\bar{L}^{1-\eta}\left\{(1+\tau)\left[\frac{\left((1+\tau)\theta\right)^{1/\eta}}{1+\left((1+\tau)\theta\right)^{1/\eta}}\right]^{1-\eta} - \left[\frac{\theta^{1/\eta}}{1+\theta^{1/\eta}}\right]^{1-\eta}\right\}$$

(25)

Combining (25) and (10)

$$P(U,C) = U^{\beta}\left\langle p_x\eta A\bar{K}_x^{\eta}\bar{L}^{1-\eta}\left\{(1+\tau)\left[\frac{\left((1+\tau)\theta\right)^{1/\eta}}{1+\left((1+\tau)\theta\right)^{1/\eta}}\right]^{1-\eta} - \left[\frac{\theta^{1/\eta}}{1+\theta^{1/\eta}}\right]^{1-\eta}\right\}\right\rangle^{1-\beta} \tag{26}$$

Returning to the consumption side of the economy, the consumer also maximizes a Cobb-Douglas utility function

$$U(X,Y) = X^{\alpha}Y^{1-\alpha} \tag{27}$$

subject to

$$p_y Y + (1+\tau)p_x X = (1-t)I \tag{28}$$

The consumer's income is composed of labor income, and capital income from the import-competing sector (less campaign contributions) and the export sector

$$I = \overline{K}_x r_x - C(\tau) + \overline{K}_y r_y + \overline{L} w \tag{29}$$

The familiar equilibrium values result from the consumer's maximization problem

$$X = \frac{\alpha(1-t)I}{(1+\tau)p_x} \tag{30}$$

$$Y = \frac{(1-\alpha)(1-t)I}{p_y} \tag{31}$$

$$U = \frac{(1-t)I\alpha^{\alpha}(1-\alpha)^{1-\alpha}}{(1+\tau)^{\alpha} p_x^{\alpha} p_y^{1-\alpha}} \tag{32}$$

where I is given by equation (29) with the factor payments evaluated at their equilibrium values [they are omitted for space, but can be readily derived from equations (17)-(24)].

Equation (30) implies that imports in equilibrium are given by

$$M \equiv p_x(X - x) = p_x \left\{ \frac{\alpha(1-t)I}{(1+\tau)p_x} - A\overline{K}_x^{\eta} \left[\overline{L} \frac{((1+\tau)\theta)^{1/\eta}}{1+((1+\tau)\theta)^{1/\eta}} \right]^{1-\eta} \right\} \tag{33}$$

Equation (22) implies that the government's political support function is

$$\left[\frac{(1-t)I\alpha^{\alpha}(1-\alpha)^{1-\alpha}}{(1+\tau)^{\alpha} p_x^{\alpha} p_y^{1-\alpha}} \right]^{\beta} \left\langle p_x \eta A \overline{K}_x^{\eta} \overline{L}^{1-\eta} \left\{ (1+\tau) \left[\frac{((1+\tau)\theta)^{1/\eta}}{1+((1+\tau)\theta)^{1/\eta}} \right]^{1-\eta} - \left[\frac{\theta^{1/\eta}}{1+\theta^{1/\eta}} \right]^{1-\eta} \right\} \right\rangle^{1-\beta} \tag{34}$$

Equation (33) implies the government's budget constraint is

$$\gamma I + f(t) = \tau p_x \left\{ \frac{\alpha(1-t)I}{(1+\tau)p_x} - A\overline{K}_x^{\eta} \left[\overline{L} \frac{((1+\tau)\theta)^{1/\eta}}{1+((1+\tau)\theta)^{1/\eta}} \right]^{1-\eta} \right\} + tI \tag{35}$$

The government maximizes (34) choosing $\{\tau, t\}$, subject to (35).

3. Results

3.1 Equilibrium

There are no closed-form solutions for t and τ. By (a) selecting values for parameters, and (b) specifying an administrative cost function, the model can be solved numerically.

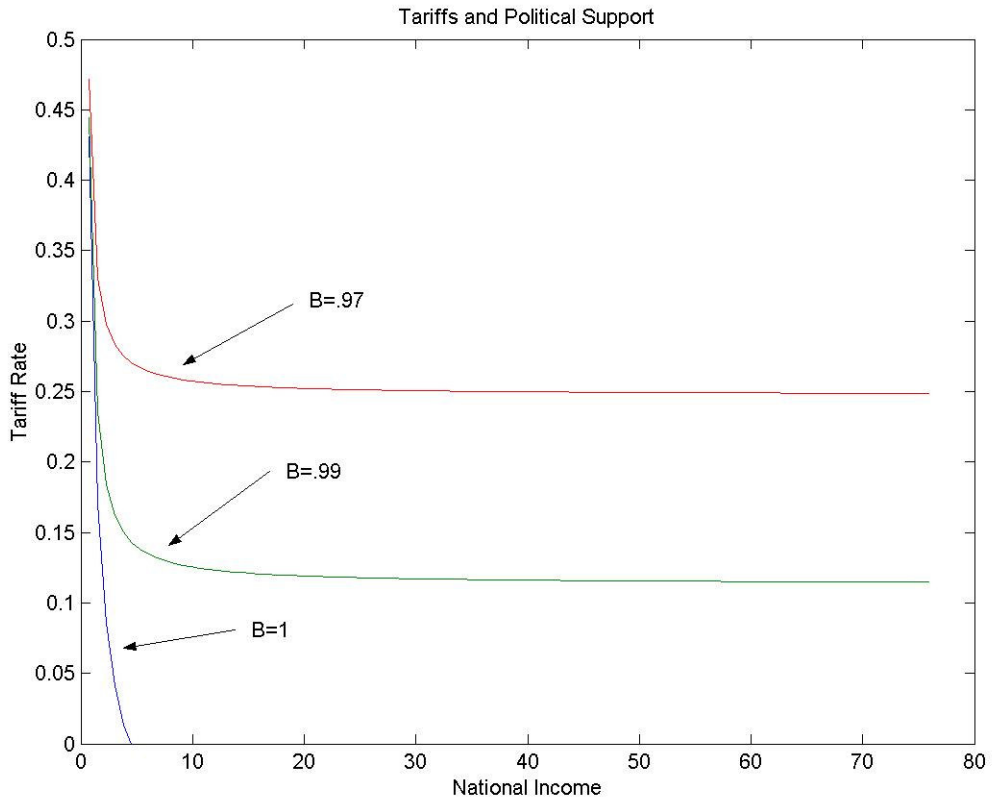
It will be useful to introduce a parameter, say Δ, that determines the size of the economy (and therefore the level of economic development), such that $A = \Delta A_0$ and $B = \Delta B_0$. So growth is driven by exogenous technological progress, and the parameter Δ can be used to perform comparative statics by exogenously changing the level of national income.

Finally, let $f(t) = st^2$ (it must be the case that $f''(t) > 0$ to satisfy the second order conditions, and this will be true when the income distribution is sufficiently skewed).

The quantities of interest are tariff and income tax revenues, and how they respond to the level of national income, the benevolence (or selfishness) of the government, and the costliness of the income tax infrastructure.

I see the model as having two "switches" than can be turned on and off separately or together. The first is the government's desire for campaign contributions–turning it off reduces the model to the typical benevolent government, that must generate revenue given that income taxes have administrative costs, while maximizing the utility of the representative agent. The second "switch" is the collection costs associated with income taxes–turning it off leaves political support as the primary incentive for imposing tariffs. Turning both "switches" off leads to a trivial model, in which tariffs will be left out of the optimal taxation scheme. Turning these "switches" on and off will help to illustrate which assumptions of the model are responsible for which predictions. These "switches" are embodied in the parameters β and s.

Figure 5



The graph above demonstrates what happens to tariff rates as national income rises (income varies based on the choice of the parameter Δ). Tariff rates fall as the nation becomes richer because the administrative cost of the income tax regime eventually becomes a negligible proportion of GDP,[14] and therefore tariffs have no collection cost advantage relative to income taxes. Administrative costs necessarily become insignificant as a percentage of GDP as GDP rises, at least in the limit. This is because there is an implicit upper bound on the income tax rate, $\bar{t} = 1$, and therefore an upper bound on administrative costs $f(\bar{t})$. Therefore

[14] It is also possible that development, in and of itself, may lower administrative costs. The physical and telecommunications infrastructure that accompanies development makes tax collection less costly. This interpretation is consistent with the model, whose results rest on the fact that the administrative costs of tax collection must fall as a proportion of GDP as GDP rises.

$\lim_{I \to \infty} \frac{f(t)}{I} = 0$.[15] In words, the appeal of tariffs as a tool of public finance disappears asymptotically.

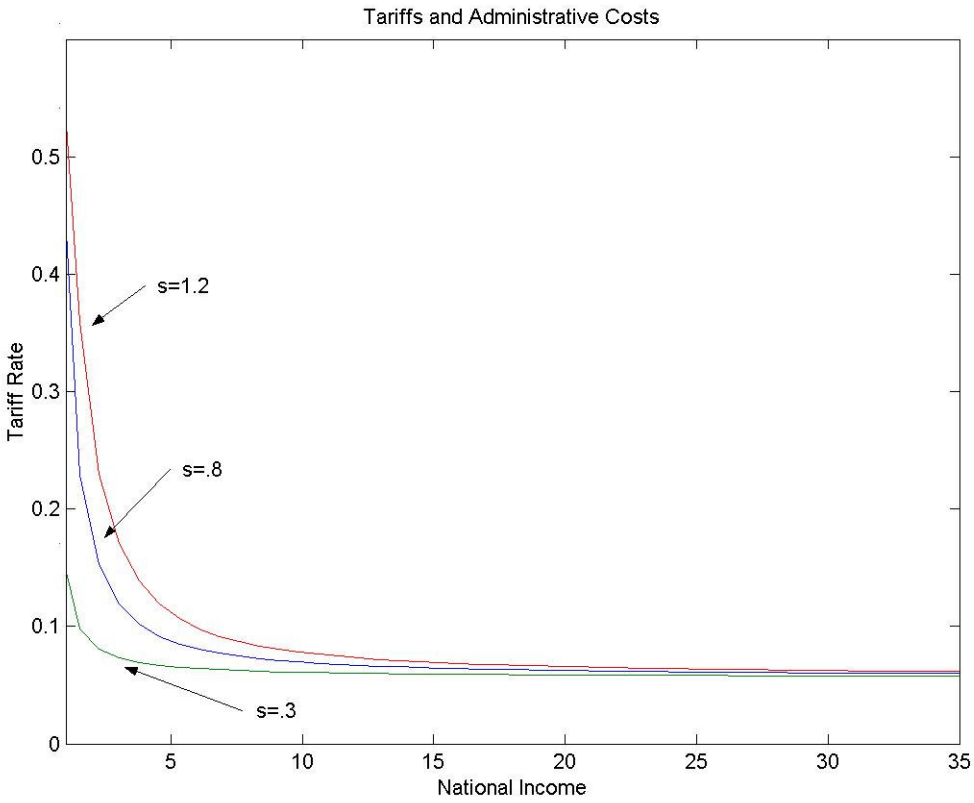
An increase in β reduces the marginal benefit of campaign contributions, and therefore also reduces tariffs. In fact, $\beta = 1$ corresponds to a benevolent government, thus the usefulness of tariffs declines very rapidly with income.

It is interesting to note that if $\beta < 1$, the tariff rate converges to a nonzero level, no matter how rich the economy grows. The government's purely political incentives give the tariff permanence in the economy despite its sub-optimality as a tool for collecting revenue in richer countries. Contrast this result with Gardner and Kimbrough (1992), in which the government completely abandons tariffs upon switching to an income tax regime. This effect is quite novel, and would not occur if tariffs did not generate political support in addition to revenue.

The parameter β can be thought of as representing deeper features of the political process and institutional framework in a given country (see Rodrik, 2002, and Acemoglu, Johnson, and Robinson, 2001).

[15] This result will hold for any administrative cost function that is consistent with the empirical evidence noted in section 2.1.

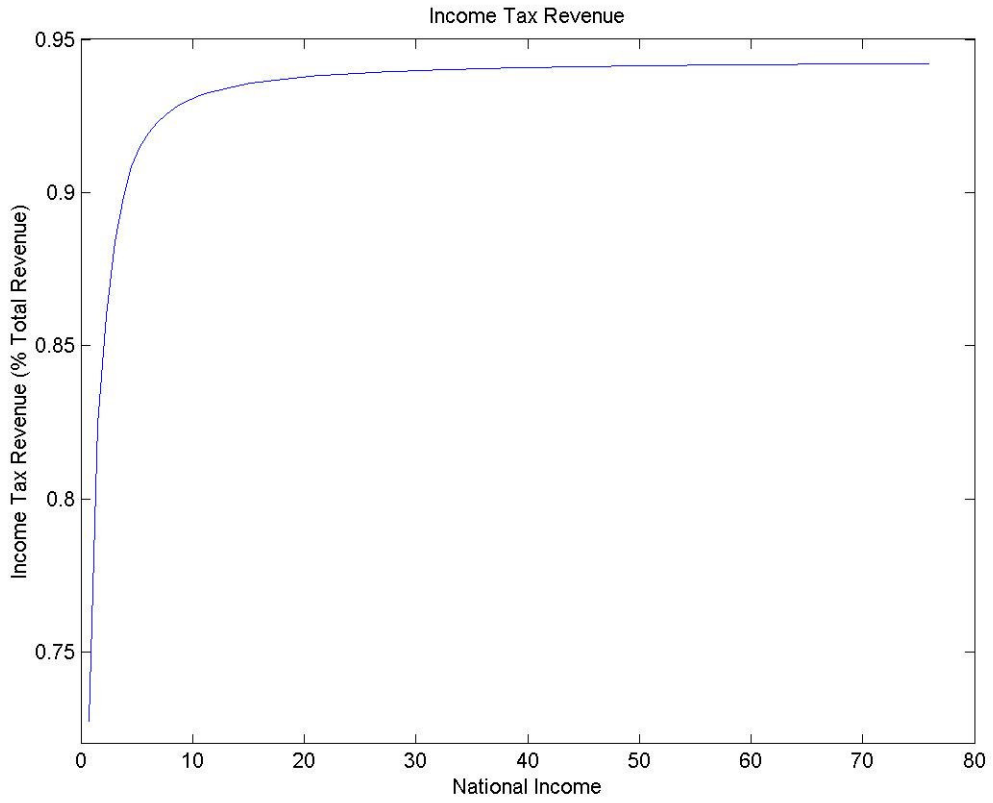
Figure 6



The above graph shows equilibrium tariffs for various values of s, the scale parameter in the administrative cost function. Clearly, an increase in s makes income tax collection more costly, and therefore tariffs relatively more attractive. This effect is only temporary, however, and tariffs converge to the same level, regardless of s.

While the income tax *rate* is relatively stable over the course of development, the percentage of government revenue provided by income taxes rises with national income.

Figure 7



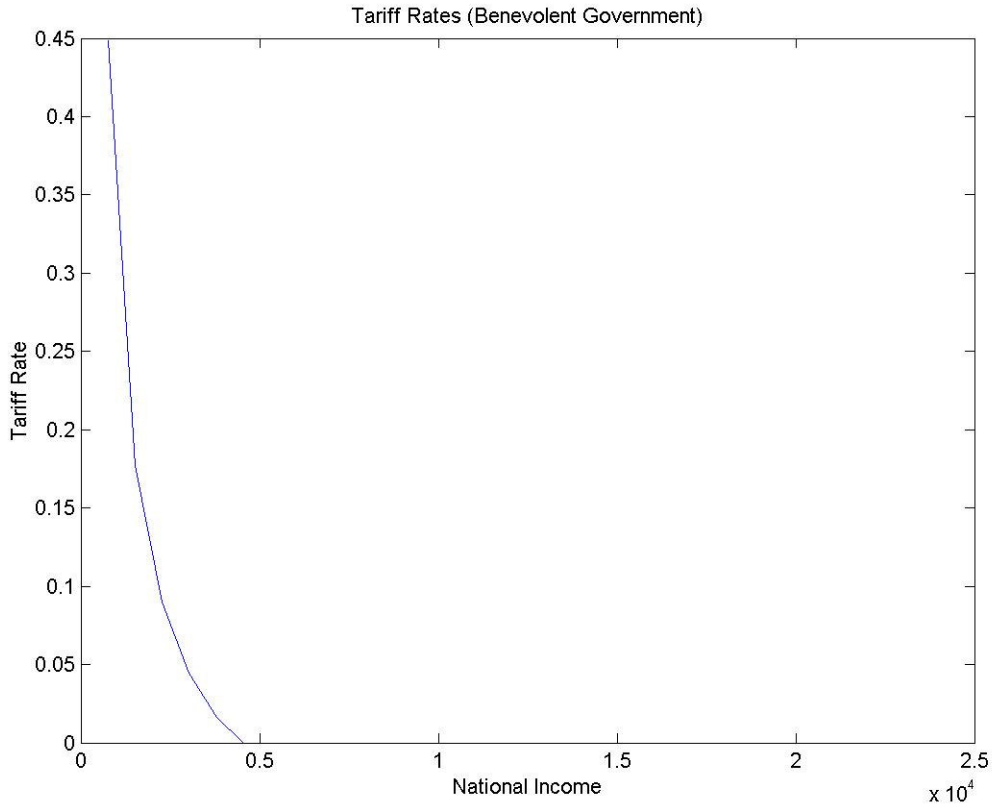
3.2 Calibration

Given information on the cost of tax collection and average tax rates, the value of the parameter s can be estimated. Take the United States, for example. The United States budgeted $7 billion for the Internal Revenue Service (IRS) in 1997 (*Investor's Business Daily*, April 16, 1997). The IRS is part of the American Treasury Department, and is charged with collecting taxes and enforcing tax laws. The US population was roughly 270 million in 1997, meaning that the IRS cost $25.93 per capita (compare to GDP per capita: $19,241 $\rightarrow$ $\frac{f(t)}{I} = .001$). According to the World Bank, in 1997 taxes collected by the federal government as a percentage of GDP was 19%. Therefore, $f(t) = st^2 = s \cdot .19^2 = 25.93 \Rightarrow s = 718$. The parameter s

estimates an upper-bound on the per capita cost of tax collection, because $f(1) = s$. Here, \$718 per capita represents the hypothetical cost of assessing all types of income taxes, on all individuals, as tax rates approached 100% (one can imagine the degree of tax evasion at such rates would be substantial!).

One question to pose to the model is the following: Can public finance motives *alone* explain the cross-sectional properties of tariff rate data? The question can be approached by observing the prediction of the model regarding tariff rates when $s = 718$ and $\beta = 1$. Tariff rates fall extremely rapidly if $\beta = 1$, dropping to zero when national income rises above \$4000 per capita.

Figure 8



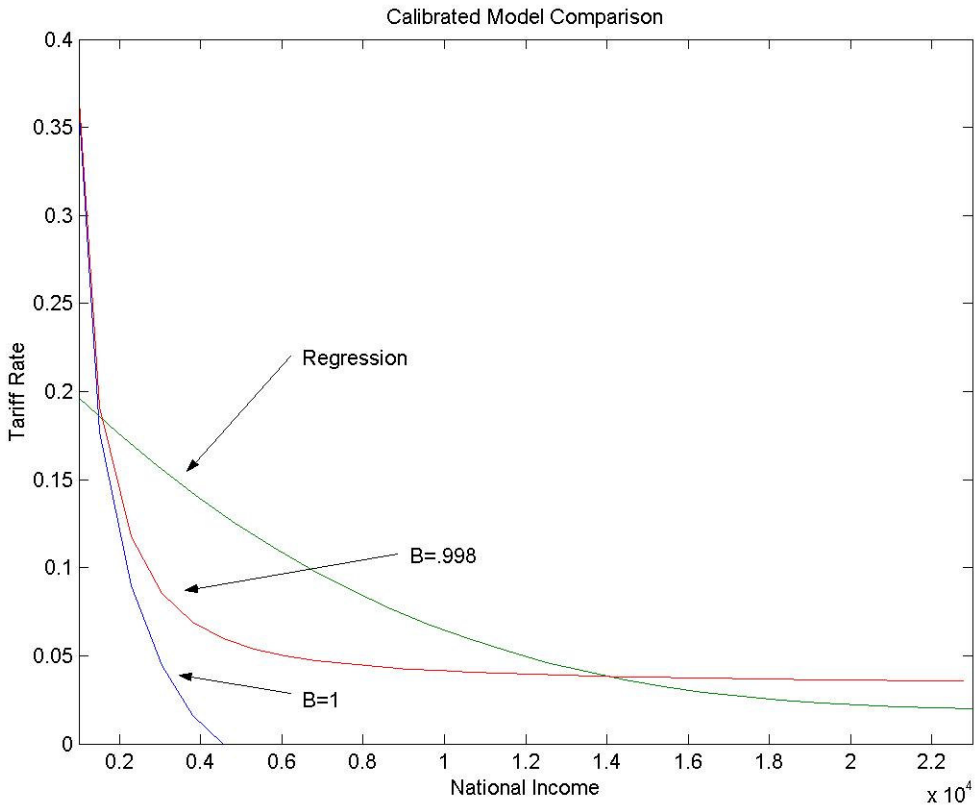
Looking again at Figures 1 and 2, this is inconsistent with the data. Tariff rates, and revenues, exhibit a slow, smooth, drop as income rises (recall the discussion in Section 1). The obvious conclusion is that $\beta < 1$.[16] Political motives are necessary to explain the gradual pattern of tariff reduction observed across countries. An alternative interpretation is that any tariffs observed in nations with per capita income greater than $4000 *cannot be justified on efficiency grounds*.

How important *are* political motives? In other words, what value of β comes closest to replicating the pattern of tariff reduction discussed in the introduction? The value of β that minimizes the least squared deviation from the model's predictions, and the regression reported in Table 1 is .998 (see Figure 9 below).[17] Bear in mind that this exercise can only suggest the relative importance of various factors in influencing the evolution of tariff rates. One cannot expect to actually replicate the cross-sectional properties of tariff rates given that there may be substantial variation in the costs of tax collection, and even institutional quality, across countries.

[16] Calibrations based on alternative administrative cost technologies would also produce this result because collection costs in the U.S. are too small to merit the use of tariffs on efficiency grounds.

[17] The value of beta does not have a cardinal interpretation so much as an ordinal interpretation. A country with a lower beta has a lower quality of governance than a country with a higher beta, but the absolute level of beta does not have convenient interpretation (see footnote 10). Further, it will be sensitive to the choice of the government's objective function.

Figure 9



3.3 Implications

The broad conclusion of the previous section is that both political support and revenue-raising motives can help explain the incidence of tariffs. A model with these dual motivations has implications for three additional policy variables: subsidies, NTBs, and the level of government spending.

Rodrik (1996) noted that the literature on the political economy of trade policy had not adequately explained governments' revealed preference for tariffs over production subsidies. In an open economy, production subsidies entail a lower deadweight loss than trade barriers because they only distort producer decisions, whereas trade barriers distort the decisions of both producers and consumers. Therefore subsidies to producers are a more efficient means of

redistribution. Mayer (2002) offers a compelling explanation for this phenomenon. Given that taxation has collection costs, "a policy instrument that redistributes income and collects revenues (tariff) has cost advantages over a policy instrument that redistributes income and spends revenues (subsidy)."

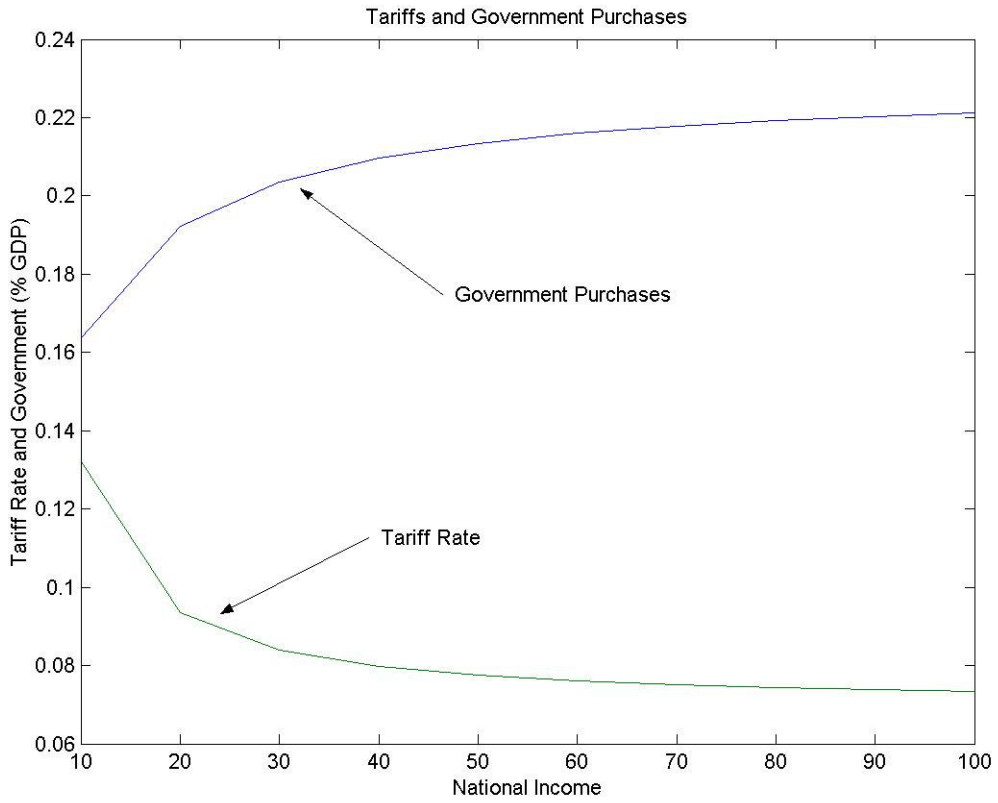
The current model is consistent with Mayer's result, though *only for poor countries*. Once the administrative costs of the income tax become negligible, the government would prefer a production subsidy or lump-sum transfer to the import-competing firm over a tariff. In other words, the government may substitute other redistributive instruments for tariffs once the nation is sufficiently rich. This may help explain why some rich nations collect no trade taxes.

Ray and Marvel (1984) note that multilateral trade liberalization is often offset by increases in NTBs. This is very much consistent with the current model as well. Once revenue motives for tariffs disappear, at high income levels, a political support maximizing government will begin to find NTBs more appealing, even though they generate no revenue (VERs, for example, or obviously protectionist "quality standards" or "safety regulations"). Yu (2000) provides a suggestion that might hasten the transition to NTBs in rich countries, "tariffs are far more transparent to the public than NTBs." If obfuscation on the part of the government can lessen the loss of political support from relatively informed consumers, then a transition from tariffs to NTBs in rich countries is unsurprising.

Finally, a modified version of the current model may shed some light on "Wagner's Law," the often studied (e.g. Ghate and Zak, 2002, or Kolluri, Panik, and Wahab, 2000) empirical finding that public expenditures rise, as a percentage of income, as income rises. The modification is to simply make government purchases endogenous by including them in the utility function and allowing the government to choose the level of G which maximizes political

support (as well as the tariff and income tax rates). In this model the increase in the size of government expenditures, scaled by GDP, is driven by the gradual increase in the efficiency of tax collection as the income tax base grows. Early reliance on tariffs, and their accompanying distortions, will cause the government to limit expenditures in order to minimize those distortions. As it becomes optimal to use less distorting taxes, government expenditures rise. See Figure 10 below, from an extended version of the model with endogenous government spending: government purchases rise and tariffs fall, consistent with data on both variables.

Figure 10



4. Conclusion

One of the defining characteristics of taxation in developing countries is the heavy reliance on tariffs as a source of revenue. One of the defining characteristics of the political

process, in developing and developed countries, is the misguided mercantilist tone surrounding trade policy debates, in which foreign competitors are demonized, and laws are enacted to protect domestic firms. The conventional wisdom on the sub-optimality of trade interventions, under most assumptions, makes this a perplexing state of affairs.

Diverging from the optimal taxation approach, I assume that the government maximizes a political support function, which is a geometric weighted average of the utility of the representative consumer, and campaign contributions. Also crucial to the model is the assumption that income taxes entail collection costs that are an increasing function of the tax rate, but not directly proportional to revenue. With these assumptions the model brings together two largely distinct theoretical approaches: research that explains tariffs as a tool of public finance, and research that explains tariffs as a tool to redistribute resources to politically important sectors of the economy.

The model's predictions capture several key features of the data. First, that tariff rates are higher in poor countries. Second, that income tax revenue, as a share of total government revenue, rises with GDP. Third, that average tariff rates decline gradually as GDP rises. Fourth, that government expenditures rise, as a percentage of income, as income rises. Fifth, and finally, that trade barriers remain common in rich countries, despite their minimal contribution to tax revenue.

Based on this model, an observer of international economic policy should view moderate poor country tariffs as a necessary method of financing useful government expenditures, and yet reserve a severe skepticism for trade barriers in richer countries. Advocating trade liberalization in extremely poor countries is problematic; the administrative costs of alternative tax regimes are potentially crippling to a fledgling government. Development lending would pay substantial

dividends if directed toward enhancing the administrative capacity of poor country governments, making the transition to a more advanced tax regime less difficult. Furthermore, unilateral trade liberalization by industrialized countries would bring about eventual reciprocal liberalization by developing countries, not through political channels, but *as trade with the developed world increased incomes, tariffs would almost certainly fall*. Another message of the model is that, contrary to the public finance approach, one should not view all observed trade barriers as economically efficient. There may be a role for international institutions, including the World Bank and the WTO, as well as domestic institutions, in reducing the weight of campaign contributions in the politician's objective function, and hence reducing tariffs. For this reason "institution building" continues to be an important target for development lending.

Turning to future research, an additional feature of this model may yield insight into poverty traps. If both administrative costs and the proportion of income devoted to government purchases are high enough, the economy lacks an equilibrium. In fact, the administrative costs of income taxation may make it impossible to finance basic government operations. This is a troubling prospect for developing nations! Assuming there is a connection between public good provision and economic growth, an extension of the current model could determine the conditions under which high tax collection costs might result in a poverty trap because the government was unable to establish the rule of law and protect basic property rights.

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