SOCIAL CONFLICT AND THE STOLPHER- SAMUELSON THEOREM

by

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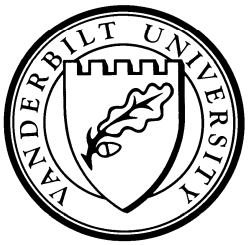

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Social Conflict and the Stolper-Samuelson Theorem[1]

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ABSTRACT: This paper presents a new theory of trade policy-making based on the possibility of social conflict, and determines the conditions under which it will apply. In a setting where property rights are poorly enforced, the paper shows that the Stolper-Samuelson theorem embodies a set of sufficient conditions for a revolution to occur. By pinpointing a conflict of interest between the ruling elite and workers over trade policy, the theorem implies that workers may have an incentive to mount a revolution. However, this also implies that the elite can use trade policy to make concessions to the workers and hence avert a revolution. In an extended framework, a set of sufficient conditions for revolution to occur are provided even when the Stolper-Samuelson theorem fails to hold. Among other uses, the new theory presents a resolution to the long-standing puzzle over why Britain repealed the Corn Laws.

KEYWORDS. Protectionism, social conflict, Stolper-Samuelson, trade policy, unilateral trade liberalization.

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1. Introduction

One of the great puzzles in the history of international trade policy is why in the mid-19th Century Britain repealed the Corn Laws, thus making a decisive unilateral move towards free trade (Schonhardt-Bailey 2006: 1). The reason this is a puzzle is because the British aristocracy had such a firm hold over the policy-making process at the time, and the Corn Laws operated so strongly in their interests, that trade liberalization seemed inconceivable. In a letter to John R. McCulloch on February 8, 1822, David Ricardo wrote:

> "I have no hope of [free trade] being adopted, the landlords are too powerful in [the first house of the British parliament] the House of Commons to give us any hope that they will relinquish the [import] tax which they have in fact contrived to impose on the rest of the community" (Peach 1993: 100).

To raise the odds against repeal of the Corn Laws even higher, the aristocracy also controlled (the second house of the British parliament) the House of Lords, which held a veto over any bill that passed through the House of Commons.[3] Ultimately, however, in June 1846 the British Prime Minister of the day Sir Robert Peel did push repeal of the Corn Laws through the House of Commons and the bill was not vetoed by the House of Lords. This political move is such a puzzle because at once it so decisively violated the core protectionist ideology of the British Conservative party while simultaneously undercutting the economic interests of the ruling landed aristocracy.

The purpose of this paper is to present a new theory of trade policy which can explain the puzzle of Britain's unilateral move to free trade, as well as trade policy-making more generally under similarly puzzling circumstances. The prior literature on the political economy of trade policy has tended to focus on a situation where policymakers balance the interests of voters against those of special interest groups (Hillman 1982, Hillman and Ursprung 1988, Magee, Brock and Young 1989, Grossman and Helpman 1994). These policy interactions are assumed to take place within the context of a well-developed political

[3] In 1860, several years after repeal of the Corn Laws, the Lords' veto power was limited by the Commons to exclude bills concerning taxation.

system wherein property rights are perfectly enforced, office is determined democratically, and political contributions are governed by constitutional limits. The theory developed in this paper, by contrast, applies to situations where property rights are poorly enforced, a ruling elite controls the government and in particular trade policy outright, while the rest of society is denied the vote and does not have sufficient resources or influence to lobby for the trade policy that it prefers. However the rest of society, represented in the model by 'the workers', may exert influence over trade policy through the periodic opportunity to mount a revolution. The analysis carried out in this paper will show that the conditions required for the Stolper-Samuelson theorem to hold represent the key components in a set of sufficient conditions for the workers to have an incentive to mount a revolution. And yet, the same set of sufficient conditions give the elite the ability to effect redistribution towards workers using trade policy and thus fully offset the incentive to mount a revolution.[4]

The threat of revolution plays a critical role in this theory of trade policy, as does the possibility of the extension of the franchise, roles for which there appears to be historical justification. As Schonhardt-Bailey (2006) explains, "...economic interests accounted for the momentum behind repeal, a momentum that overshadowed almost all else. Indeed, as part of a broader impulse toward democratic reform, these same interests, left unsatisfied, could have snowballed into revolution, as Peel and others feared (and as happened just two years later in France)."

The model developed in this paper combines a standard model of international trade with a model of social conflict and franchise extension by Acemoglu and Robinson (2000, henceforth referred to as AR). The combination of these two models extends each in a non-trivial way to provide a new model. Perhaps most importantly, in standard models of international trade property rights are perfectly enforced while in the present model the factor(s) owned by the elite can be expropriated by the workers in a revolution. Therefore, the present model makes it possible to incorporate considerations of social conflict leading to expropriation and franchise extension in a model of trade policy-making. At the same time, following AR, previous models of social conflict and franchise extension have tended

[4]I use the phrase 'effect redistribution' to emphasize that the elite bring about redistribution towards workers indirectly by manipulating prices, as opposed to directly through the use of transfers.

to focus on a simple one-sector production structure with a single factor of production while in our model there are more than one of each. It is the extension of the trade model to allow for expropriation that provides the fundamental motivation for the new theory of trade policy developed here. It is the extension of the production structure to more than one good and factor that gives rise to a more nuanced set of circumstances under which the threat of revolution exists; these are embodied in the Stolper-Samuelson Theorem and based on the general equilibrium interactions of the model.

By developing a new theory of trade policy, this paper represents a development in the theory of social conflict and franchise extension because the prior literature has tended to focus on a closed economy setting. In particular, the prior literature has focused on domestic taxation. Our focus here on trade policy as opposed to domestic policy seems appropriate since many dictatorships and partial democracies at an early stage of development rely extensively, often exclusively, on trade policy to fulfill their fiscal objectives, including those of maintaining social stability.

There is a large literature on Peel's paradoxical repeal of the Corn Laws, summarized nicely by O'Rourke and Williamson (1999, ch.5) and Schonhardt-Bailey (2006, see especially chs.1-2); see also Irwin (1989). Two positions have emerged in this literature. The first position has it that growing urbanization in Britain made repeal inevitable. This view emphasizes the role of urban interest groups, conforming to the literature on the political economy of protection referred to above. The second position attributes repeal to the force of logic behind the argument that free trade maximized national welfare. Kindleberger (1975) credits Ricardo, Cobden and others with bringing about repeal.

Yet neither of these positions takes account of how much the British aristocracy stood to loose from repeal nor the power that they held over the policy-making process. Williamson (1990) estimates that repeal of the Corn Laws, entailing the removal of a 54 percent tariff on grain, implied a 49 percent reduction in grain rents. Non-grain rents (on pasture, in the north and west of England) would have fallen by 6.5 percent. To substantiate the conventional 'political economy of protection' view of repeal would have required compensating transfers of this magnitude from urban interests to the land-owning aristocracy in order to persuade them not to use their veto in the House of Lords. Yet there is no evidence that transfers of this magnitude actually took place.

Although the puzzle over British 19th century trade liberalization provides useful motivation, the theory developed here will apply more generally to any situation of elite rule where members of society outside the elite are too poor and disenfranchised to influence government but sufficiently numerous to (occasionally) threaten to mount a revolution. This was the situation prevailing throughout Europe from the 1500s until the eve of the Second World War and especially between 1820 and 1938 (Tilly 1993). And this is also the situation throughout significant parts of the developing world today. Indeed, this theory might be used (in future research) to understand why a significant number of countries throughout the developing world have recently undertaken unilateral trade liberalization after years of protectionism (Baldwin 2010). These possibilities are discussed at greater length in the next section, after the statement of Proposition 1.

The paper is structured as follows. Section 2 sets out the Heckscher-Ohlin model with social conflict and demonstrates the sufficient conditions, embodied in the Stolper-Samuelson theorem, both for the workers in the model to mount a revolution and for the elite to avert its occurrence using trade policy. Section 3 relaxes the conditions required for the Stolper-Samuelson theorem to hold, focusing for concreteness on the Specific Factors model, and shows how in this setting the incentive for a revolution may be removed. Then a set of sufficient conditions are established for there to be a threat of revolution over trade policy when the Stolper-Samuelson theorem does not hold. Section 4 concludes.

2. The Heckscher-Ohlin Model with Social Conflict

The model is of a single small country that takes world prices as given. Each citizen in this country is placed in one of two socioeconomic groups: the elite, e, or the workers, l. The mass of the total population is normalized to one, and the share of the elite and workers in the population is fixed exogenously at $1-\zeta$ and ζ respectively.

The model has an infinite time horizon. A subscript t denotes the time period $t = 0, 1, ..., \infty$. The economy is endowed with a unit each of two primary factors: labor, L, and land, T. Initially, all of the land is distributed evenly among members of the elite, with no land belonging to the workers, while each worker is given an equal share of the

labor endowment.[5] All members of each group, the elite and the workers respectively, are identical to one another. Each group differs from the other only by its initial factor endowment. For brevity, we will say that there are 'boundary endowments'. This is a stylized characterization of the endowment structure in many developing countries where the distribution of asset ownership is highly skewed towards the elite. The rental rate on land in period t is denoted by r_t and the wage rate in period t is denoted by w_t.

Both primary factors, supplied inelastically on aggregate, are fully employed in the production of two commodities, referred to as food and manufactures, that are priced at p_t^f and p_t^m respectively. Land is used intensively in the production of food while labor is used intensively in the production of manufactures. Let food be the numeraire in the model, so that $p_t^f = 1$ for all t, and let $p_t = p_t^m/p_t^f$.

The economy is competitive, both in production and factor markets. Production technology in each sector exhibits constant returns to scale. There is free entry into both sectors so that profits are driven to zero. And there is free mobility of factors between sectors so each factor receives the same return in each sector equated to the value of its marginal product. If the economy is open then goods may be traded internationally but factors are not internationally mobile.

2.1. Understanding the basic structure of the model with exogenous prices

Since the structure of the economy set out above is that of a standard 2×2 Heckscher-Ohlin model, the standard results hold. We are particularly interested in the Stolper-Samuelson Theorem which demonstrates that if, in a given period, p_t is increased then the real wage unambiguously increases while the real return to land unambiguously decreases. Following Jones (1965), and using 'hat algebra' whereby a hat over a variable represents a proportional change, $\hat{x} = dx/x$, we can express the main implication of the Stolper-

[5] The model might appear overly stylized in that the elite are not endowed with labor. A looser interpretation of this assumption would be that the elite are also endowed with labor but that they are 'idle' in the sense of not using it. One reason could be that, given their income from land, the equilibrium wage is below their reservation wage. An alternative interpretation would be that the elite are engaged in managerial activities associated with their land and are therefore not in a position to use their labor in the production process.

Samuelson Theorem as follows:

$$\hat{w}_t > \hat{p}_t > 0 > \hat{r}_t.$$

This result will be useful in determining the gains to the respective groups from changes in p_t.

Every citizen in the country has the same homothetic utility function defined over their consumption of the two goods:

$$u_t = u\left(d_t^f, d_t^m\right),$$

where d_t^j is consumption of good $j \in \{f, m\}$. From this specification of preferences we can determine the indirect utility function for a representative member of group $i \in \{e, l\}$ as a function of prevailing prices and their income: $v_t^i = v\left(p_t^f, p_t^m, y_t^i\right)$, where y_t^i is the income of the representative member of group i in period t. The indirect utility function has the standard properties that it is decreasing in p_t^f and p_t^m. We will make the slightly stronger-than-usual assumption that the indirect utility function is strictly increasing in y_t^i. Incorporating our choice of numeraire, we can express indirect utility as a function of relative prices:

$$v_t^i = v\left(p_t, y_t^i\right)$$

Based on initial endowments and population shares, $y_t^e = r_t/\left(1-\zeta\right)$ and $y_t^l = w_t/\zeta$.

The production structure of the model and our specification of boundary endowments and homothetic preferences gives rise to a useful property. We can say that a worker will be made unambiguously better off, and a member of the elite will be made unambiguously worse off, by an increase in p_t. The reverse holds for a decrease in p_t. We can see this immediately by first rewriting the indirect utility function as $v\left(p_t/y_t^i, 1\right)$, or for brevity $v\left(p_t/y_t^i\right)$. Then observe that, by the Stolper-Samuelson Theorem, p_t/w_t decreases with an increase in p_t, which increases the indirect utility of a worker, $v\left(p_t/\left(w_t/\zeta\right)\right)$; on the other hand p_t/r_t increases with an increase in p_t, which decreases the indirect utility of a member of the elite, $v\left(p_t/\left(r_t/\left(1-\zeta\right)\right)\right)$.

As we shall see, this feature of the model gives rise to a tendency for workers to set a higher value of p_t if they seize power than do the elite when they hold power. This simple relationship could reflect one of two possible situations. If the country had a comparative

advantage in manufactures, then the tendency of the workers to set p_t relatively high would reflect a desire for the workers to trade as freely as possible so that they could obtain imports of food relatively cheaply. An export tax on manufactures would lower the domestic price of manufactures by the amount of the tax. This would in turn lower the price of manufactures relative to food, and hence reduce the welfare of workers. An import tariff on food would have the same effect via an increase in the relative price of food. Thus either type of trade policy intervention would make workers worse off. If on the other hand the country had a comparative advantage in the production of food then workers' desire to set p_t relatively high reflects their desire to protect domestic production of manufactures against foreign competition. This could be achieved either by an import tariff on food or by an export tax on manufactures; in either case workers would favor trade policy intervention. In the simple set-up of the model above, where the only arguments to enter each agent i's indirect utility function are p_t and y_t^i, in the former situation workers want to adopt free trade while in the latter situation they want to adopt autarky. Under a more general specification, the preferred tariff need not be at either of these two extremes. In each of the two respective situations, the incentives of the elite are exactly the reverse. Again, there is no need to impose the restriction that the elite desire either autarky or free trade under the respective situations. Writing the workers' preferred price level as p^{l*} and the elites' preferred price level as p^{e*}, we have that $p^{l*} > p^{e*}$. This is essentially a strong version of the Stolper-Samuelson theorem that follows from the additional restrictions we have imposed on endowments (i.e. boundary) and preferences (i.e. homothetic). Without these restrictions, we could not make unambiguous inferences about the effects of price changes on the welfares of the respective groups, and so could not say anything about each group's preferred price level. As is clear from the above discussion, the theorem holds regardless of whether the country has a comparative advantage in food or manufactures.

2.2. Motivating the determination of trade policy by endogenizing prices

We will endogenize p_t by incorporating the Hecksher-Ohlin model of international trade set out above into the model of social conflict and franchise extension developed by Acemoglu and Robinson (2000). Initially, political power is held by the elite. The only way that the elite can exercise this power in the model is through their control of trade policy.

For comparability with the earlier literature, we will assume that any revenue raised from trade policy is redistributed to consumers in lump sum and any revenue required to operate trade policy can be raised through lump-sum taxation. Under this specification, and for parsimony of notation, we can say that while the elite hold power they set p_t directly.

Although initially they do not hold power, at any point in time $t \geq 0$ the workers can mount a revolution that topples the ruling elite, after which they install a democracy through which the median voter determines trade policy, p_t. The same outcome of democracy can arise if the elite decide voluntarily to extend the franchise. Assume that $\zeta > 1/2$ and so if there is full democracy the median voter is a worker. We will formalize the form of government, F, as either rule by the elite, E, or democracy, D.

In the process of revolution, the workers also seize the land from the elite. Revolution reduces the productivity of labor and land by the same proportion, $1-\beta_t$. This is because the production process in both sectors is less efficiently managed by workers than by the elite.[6] Assume that β is stochastic and alternates between two values: $1 > \overline{\beta} > 0$ and $\underline{\beta} = 0$, with $\Pr\left(\beta_t = \overline{\beta}\right) = \rho$ independently of any value of β in the past. As Acemoglu and Robinson emphasize, the fact that β fluctuates captures the idea that some periods may be more conducive to revolution than others. This also introduces the feature that a promise by the elite to set tariffs in the interests of the workers may not be credible given a change of circumstances in the next period.

Within a period, t, the sequence of events is as follows.

1. The state β is revealed.
2. The elite decide whether or not to extend the franchise. If not, they set the tariff.
3. The workers decide whether or not to mount a revolution. If they do not and the elite have extended the franchise then the tariff rate is set by the median voter (a worker). If they do mount a revolution and it is successful then the tariff rate is reset by the median voter.

[6] This assumption is taken to reflect the idea that workers are less experienced in production management than the elite. In practice we would expect the effects of this inexperience to atrophy over time but we will ignore this complication in the present analysis.

4. Production takes place, demands are realized, markets clear and consumption takes place.

5. If the franchise is extended then, by assumption, it cannot be rescinded; in $t+1$ the process starts from stage 3. Otherwise it starts from stage 1.

The fact that all members of each of the two respective groups, the elite and the workers, are identical to one another (but obviously differ across groups by their endowments) makes the analysis of the game played between the two groups significantly easier. The reason is that all members of the elite can be treated as one player and all workers can be treated as a second player. Also, it is not possible for any worker to free-ride on the revolutionary activities of the others because if they did they would be excluded from the proceeds of the revolution.[7] So we can model the situation set out above as a two-player game between the elite and the workers.

2.3. Equilibrium

The concept of equilibrium we will use is that of Markov Perfection, wherein each player's strategy depends only on the state in a given period, which is given by the value of β, either $\underline{\beta}$ or $\overline{\beta}$, and the form of government, F, which is either D or E.

The strategies played by the respective groups are as follows. Let $\sigma^e(F;\beta)$ be the strategy played by the elite when the state is $\beta = \underline{\beta}$ or $\overline{\beta}$ and when the form of government is $F = D$, or E. The elite decide whether to extend the franchise: $f = 0$ if they do not extend the franchise and $f = 1$ if they do. If $f = 0$ then $F = E$ in that period; if $f = 1$ then $F = D$ in that period and for all periods thereafter. If $f = 0$ then the elite also set the price level at p^e; not necessarily at p^{e*} as we shall see. Let $\sigma^l(F|\, f, p^e; \beta)$ be the strategy played by the workers. This consists of the decision as to whether or not to mount a revolution; $a = 1$ if they do (where a is a mnemonic for 'agitate') and 0 otherwise. If the form of government is democracy, $F = D$, then the workers set the price level at p^l. Since by the timing of events determined above the elite move before the workers, the

[7] While there is no free-rider problem, there may be a problem of coordination between workers over revolution. This problem is ignored in the present paper but has been studied in a closed-economy context by Ellis and Fender (2011).

strategy of the workers in a given period is conditioned on that of the elite. Let $\widetilde{\sigma}^e(F;\beta)$ be a best response to $\sigma^l(F|\, f, p^e;\beta)$ for all F, β, and let $\widetilde{\sigma}^l(F|\, f, p^e;\beta)$ be a best response to all $\sigma^e(F;\beta)$ for all F, β. Then a pure strategy Markov Perfect equilibrium is a set of mutual best responses $\left\{\widetilde{\sigma}^e(F;\beta), \widetilde{\sigma}^l(F|\, f, p^e); \beta\right\}$.

In our characterization of equilibrium, we will restrict attention to the region of the parameter space where the elite may have a commitment problem over trade policy. That is, under the threat of revolution they may not be able to avert its occurrence by (credibly) promising to set $p^e = p^{l*}$; but the elite will be able to avert revolution by extending the franchise and with it the power to set trade policy, facilitating $p^l = p^{l*}$. Let $V^i\left(R, p^{l*}\right)$ represent the present discounted value under revolution, to a representative member of group $i \in \{e, l\}$. For a worker,

$$V^l\left(R, p^{l*}\right) \equiv \frac{v\left(p^{l*}, \overline{\beta}\left(\left(w^{l*} + r^{l*}\right)/\zeta\right)\right)}{1-\delta} \tag{2.1}$$

where payoffs over the infinite horizon are discounted by a common discount factor, δ, $0 < \delta < 1$. Also, w^{i*} and r^{i*} are the equilibrium values of w_t and r_t when, in any period t, $p_t = p^{i*}$; that is when group $i \in \{e, l\}$ are in power and set prices at their preferred level. Worker income, $\overline{\beta}\left(\left(w^{l*} + r^{l*}\right)/\zeta\right)$, reflects the fact that in addition to owning labor they have seized all the land and that their productivity is determined partly by their managerial productivity $\overline{\beta}$. Because in a revolution the elite lose everything, $V^e\left(R, p^{l*}\right) = 0$. Since $\underline{\beta} = 0$, the workers do not attempt a revolution when $\beta = \underline{\beta}$ because in that event their payoff would be zero.

We will restrict attention to the region of the parameter space where the success of democracy in preventing revolution is guaranteed. To determine this restriction, observe that the value to a worker of democracy is

$$V^l\left(D, p^{l*}\right) \equiv \frac{v\left(p^{l*}, w^{l*}/\zeta\right)}{1-\delta}. \tag{2.2}$$

The only difference between $V^l\left(R, p^{l*}\right)$ and $V^l\left(D, p^{l*}\right)$ is the level of a worker's income; $\overline{\beta}\left(\left(w^{l*} + r^{l*}\right)/\zeta\right)$ versus w^{l*}/ζ. We can ensure that workers prefer democracy to revolution by imposing the following restriction on the value of $\overline{\beta}$:

A1. Given (a unique) p^{l*}, which gives rise to w^{l*} and r^{l*} in competitive equilibrium, assume that $\overline{\beta} \in (0,1)$ is sufficiently small that $\overline{\beta}\left(\left(w^{l*} + r^{l*}\right)/\zeta\right) < w^{l*}/\zeta$.

If $\overline{\beta}\left(\left(w^{l*}+r^{l*}\right)/\zeta\right) < w^{l*}/\zeta$ then $V^l\left(R,p^{l*}\right) < V^l\left(D,p^{l*}\right)$ as required. All else equal, workers' income will increase if augmented by the proceeds of capital seized from the elite. But with $\overline{\beta}$ sufficiently small, the productivity of the economy's primary factors after revolution is sufficiently low as to make revolution less attractive than democracy. A1 will be assumed to hold throughout this section.

At the same time as wanting to ensure that extension of the franchise defuses revolution, recall that we also want to restrict attention to a situation where the elite cannot always simply head off revolution by temporary redistribution using trade policy. Assume that in period t the state is $\overline{\beta}$. The revolution constraint is then given by the following:

$$\frac{v\left(p^{l*},\overline{\beta}\left(\left(w^{l*}+r^{l*}\right)/\zeta\right)\right)}{1-\delta} > v\left(p^{l*},w^{l*}/\zeta\right)+\delta\frac{v\left(p^{e*},w^{e*}/\zeta\right)}{1-\delta}.$$

This expression says that the discounted payoff to revolution (on the left hand side) is greater than the immediate payoff from a single period in which the elite set the workers' preferred trade policy p^{l*} followed by a return to the elites' preferred trade policy in all periods thereafter. The following result establishes the conditions under which the revolution constraint binds.

Lemma 1. *Assuming A1, and a sufficiently high (common) discount factor, δ, there exists a range of values of $\overline{\beta}$ sufficiently high that the payoff to workers from revolution, with trade policy subsequently chosen by the median voter, is greater than a future of trade policy set by the elite, but sufficiently low that the payoff to democracy is greater than the payoff to revolution.*

Proof: See Appendix.

The intuition behind this result is as follows. If workers are relatively impatient (δ close to zero) then given the opportunity of mounting a revolution, $\beta=\overline{\beta}$, they can be dissuaded from doing so by a single period of redistribution using trade policy; we know by A1 that $v\left(p^{l*},w^{l*}/\zeta\right) > v\left(p^{l*},\overline{\beta}\left(\left(w^{l*}+r^{l*}\right)/\zeta\right)\right)$. But if workers are sufficiently patient (δ sufficiently close to 1), then the relatively low payoff that they would receive in future periods if the opportunity for revolution passes, $\beta=\underline{\beta}$, and the elite responded by restoring their preferred trade policy, would not be sufficient to compensate for the higher payoff they could receive from revolution. Thus we can restrict attention to a situation where the

elite cannot credibly commit to the trade policy that would be preferred by the workers. For the revolution constraint to hold requires that $\overline{\beta}$ be sufficiently high as to ensure that revolution yields workers a payoff greater than a future of trade policy set by the elite (but not so high that revolution yields workers a higher payoff than democracy, violating A1).

Based on Lemma 1, the following assumption ensures that the revolution constraint binds without A1 being violated.

A2. Given (unique) p^{e*} and p^{l*}, assume $\overline{\beta}$ is sufficiently large that $v\left(p^{l*}, \overline{\beta}\left(\left(w^{l*}+r^{l*}\right)/\zeta\right)\right) > v\left(p^{e*}, w^{e*}/\zeta\right)$ but not so large as to violate A1. Given this value of $\overline{\beta}$, assume that δ is sufficiently high that the revolution constraint is satisfied.

We are now ready to proceed with our characterization of equilibrium. In order to do so, we will represent the payoffs to the respective groups over time in Bellman-equation form. If in period t the state is $\underline{\beta}$ and the elite are in power, there is no threat of revolution. Therefore, in Markov Perfect Equilibrium, $f = 0$ and $p^e = p^{e*}$. We can then write the value function of a worker as

$$V^l\left(E, p^{e*}; \underline{\beta}\right) \equiv v\left(p^{e*}, w^{e*}/\zeta\right) + \delta\left(\rho V^l\left(E, p^e; \overline{\beta}\right) + (1-\rho)\, V^l\left(E, p^{e*}; \underline{\beta}\right)\right).$$

Note from the first term in parentheses that, under the threat of revolution, the elite will tend to set a price p^e other than p^{e*} as we will discuss shortly. The value for a member of the elite is written in the same way except that V^e replaces V^l and $r^{e*}/(1-\zeta)$ replaces w^{e*}/ζ.

Now consider the situation where in period t, with the elite in power, the state is $\overline{\beta}$ and so the threat of a revolution does exist. As outlined previously, the elite have two options as to how to address this threat. The first is to extend the franchise, $f = 1$. Under democracy the median voter, a worker, will vote for their most preferred price level p^{l*} and the payoff to a worker will be $V^l\left(D, p^{l*}\right)$ as given by (2.2). The second option is not to extend the franchise but to instead effect redistribution towards workers using trade policy; setting $f = 0$ and $p^e = p^s$, where p^s is higher than p^{e*}, though not necessarily as high as p^{l*}, and so implies a higher real income and level of utility for workers. Given either of these two actions by the elite, in principle the workers may still prefer to respond

by mounting a revolution. Thus a worker's strategy solves the problem

$$\max\left\{V^l\left(R,p^{l*}\right);fV^l\left(D,p^{l*}\right)+(1-f)V^l\left(E,p^s;\overline{\beta}\right)\right\}.$$

We have already determined in (2.1) and (2.2) the payoffs to workers from revolution, $V^l\left(R,p^{l*}\right)$, and democracy, $V^l\left(D,p^{l*}\right)$, respectively. The payoff to a worker when the elite effect redistribution by setting p^s is

$$V^l\left(E,p^s;\overline{\beta}\right)\equiv v\left(p^s,w^s/\zeta\right)+\delta\left(\rho V^l\left(E,p^s;\overline{\beta}\right)+(1-\rho)V^l\left(E,p^{e*};\underline{\beta}\right)\right). \tag{2.3}$$

The payoff in the current period under p^s is $v\left(p^s,w^s/\zeta\right)>v\left(p^{e*},w^{e*}/\zeta\right)$. If in the following period the state of $\overline{\beta}$ is maintained then the elite will continue to set p^s and worker utility will be maintained at the same level. But if the state changes to $\underline{\beta}$ then the elite (renege on any promise to maintain redistribution with p^s and) restore their preferred trade policy, bringing about the price level p^{e*}.

We now want to consider the circumstances under which it would be possible for the elite to prevent revolution by effecting redistribution. Let $\widetilde{V}^l\left(E|\,\rho;\overline{\beta}\right)$ be the maximum utility that the elite can induce among workers without extending the franchise. This maximum utility is induced by setting $p^s=p^{l*}$ in (2.3): $\widetilde{V}^l\left(E|\,\rho;\overline{\beta}\right)=V^l\left(E,p^{l*};\overline{\beta}\right)$.

Applying the logic developed by AR, we will now establish that there exists a critical level of ρ, denoted $\overline{\rho}$, at which the elite are just able to prevent a revolution by effecting redistribution. The characterization of the equilibrium outcome will depend on whether ρ is above or below $\overline{\rho}$. First consider the maximum utility that can be induced among workers when $\rho=1$: By (2.2)

$$\widetilde{V}^l\left(E|\,\rho=1;\overline{\beta}\right)=\frac{v\left(p^{l*},w^{l*}/\zeta\right)}{1-\delta}=V^l\left(D,p^{l*}\right).$$

Now recall that, by A1, $V^l\left(D,p^{l*}\right)>V^l\left(R,p^{l*}\right)$.

Next consider the maximum utility that can be induced among the workers when $\rho=0$:

$$\widetilde{V}^l\left(E|\,\rho=0;\overline{\beta}\right)=v\left(p^{l*},w^{l*}/\zeta\right)+\frac{\delta v\left(p^{e*},w^{e*}/\zeta\right)}{1-\delta}<V^l\left(R,p^{l*}\right)$$

by A2. In addition, by the Stolper-Samuelson theorem with boundary endowments and homothetic preferences, $\widetilde{V}^l\left(E|\,\rho;\overline{\beta}\right)$ is continuously and monotonically increasing in ρ.

Therefore, by the intermediate value theorem, there exists a unique $\overline{\rho} \in (0,1)$ for which $\widetilde{V}^l\left(E|\,\rho;\overline{\beta}\right) = V^l\left(R,p^{l*}\right)$. By the same result, $V^e\left(E,p^s;\overline{\beta}\right)$ is decreasing in p^s. Also observe that $V^e\left(E,p^s;\overline{\beta}\right) > V^e\left(D,p^{l*}\right)$ because when the elite hold power $p^s \in \left(p^{e*},p^{l*}\right)$ whenever $\beta = \overline{\beta}$ but $p^s = p^{e*}$ when $\beta = \underline{\beta}$. With that, we now have all the elements in place to characterize equilibrium.

Proposition 1. *Assume A1 and A2 and that the economy is characterized by the Heckscher-Ohlin model. For $\rho \neq \overline{\rho}$ there exists a unique pure strategy Markov Perfect Equilibrium wherein*

1. *If $\rho < \overline{\rho}$ then the elite will respond to the threat of revolution by extending the franchise: $\widetilde{\sigma}^e\left(E;\underline{\beta}\right) = (f=0,p^e=p^{e*})$, $\widetilde{\sigma}^e\left(E;\overline{\beta}\right) = (f=1,\cdot)$; $\widetilde{\sigma}^l\left(E|\,f=0,p^e;\overline{\beta}\right) = (a=1)$, $\widetilde{\sigma}^l\left(E|\,f=1,\cdot;\underline{\beta}\right) = \left(a=0,p^l=p^{l*}\right)$ and $\widetilde{\sigma}^l\left(D;\underline{\beta}\right) = \left(p^l=p^{l*}\right)$.*

2. *If $\rho > \overline{\rho}$ then the elite will effect temporary redistribution using trade policy in response to the threat of revolution: $\widetilde{\sigma}^e\left(E;\underline{\beta}\right) = (f=0,p^e=p^{e*})$, $\widetilde{\sigma}^e\left(E;\overline{\beta}\right) = (f=0,p^e=p^s)$ where $p^s \in \left(p^{e*},p^{l*}\right)$ is defined by $V^l\left(E,p^s;\overline{\beta}\right) = V^l\left(R,p^s\right)$, and $\widetilde{\sigma}^l\left(E|\,f=0,p^e;\overline{\beta}\right) = (a=0)$ for all $p^e \geq p^s$. Off the equilibrium path, $\widetilde{\sigma}^l\left(E|\,f=0,p^e;\overline{\beta}\right) = \left(a=1,p^l=p^{l*}\right)$ for all $p^e < p^s$, $\widetilde{\sigma}^l\left(E|\,f=1,p^e;\overline{\beta}\right) = \left(a=0,p^l=p^{l*}\right)$ and $\widetilde{\sigma}^l\left(D;\overline{\beta}\right) = \left(p^l=p^{l*}\right)$.*

Proposition 1 has the surprising feature that the elite can use trade policy to defuse a revolution when at any given time the opportunity to mount a revolution is relatively likely to arise; i.e. when $\rho > \overline{\rho}$. With the elite initially in power, only when the opportunity to mount a revolution is relatively unlikely must the elite extend the franchise to the workers if the state switches from $\underline{\beta}$ to $\overline{\beta}$, and with it the power to set trade policy. We can see that when a revolution is relatively unlikely, the elite cannot credibly make a commitment to effect transfers using trade policy because when the opportunity to mount a revolution ceases then so will the (effective) transfers. On the other hand, if the opportunity to mount a revolution is relatively likely, the elite know that they can be held to account over their promise to effect transfers.

This feature parallels a similar result established by AR over the use of domestic taxation in a one-sector-one-factor framework. However, while AR used their result to

explain the extension of the franchise in Western Europe, we are more interested in how this result can be used to explain the elite's use of trade policy to defuse the threat of revolution and hence maintain the status quo. Proposition 1 can be used to explain why Britain repealed the Corn Laws but at the time did not extend the franchise; this relied on the fact that, as discussed in the Introduction, at that time in Britain the threat of revolution was relatively high. Repeal of the Corn Laws is reflected in the fact that the elite were forced to set $p^s = p^{l*}$ in order to prevent a revolution.

The fact that the elite were forced to go all the way to the preferred policy of the workers suggests that it was necessary to make a relatively large concessions to the workers in order to make them indifferent between mounting a revolution and maintaining the status quo. One interpretation is that the workers placed a relatively high value on being able to set trade policy democratically in the future, reflected in a high value of δ. Another is that they stood to gain a lot from the transfers entailed by trade liberalization. Both possibilities seem to be well grounded in historical account. First, the workers were relatively well organized under the auspices of the Anti-Corn-Law League, the main pressure group that coordinated the efforts of the workers to push for repeal. It seemed quite plausible to argue that this pressure group would manage the transition to democracy quite well and continue to represent the interests of workers over trade policy. Second, workers were indeed relatively homogeneous in their interests over liberalization of trade policy. Britain at the time had the highest urbanization rate in the world and the workers would clearly benefit from the availability of cheap imported food; indeed this was the main impetus behind repeal (Schonhardt-Bailey 2006).

Proposition 1 can also be used to explain trade policy in mainland Europe during that period. Most importantly, in the Introduction we noted the prevailing threat of revolution that existed in the region particularly throughout the nineteenth and early twentieth centuries (Tilly 1993). Although trade liberalization in mainland Europe came later than in Britain, when it did so it came "with a rush... The Cobden-Chevalier treaty was signed between France and the UK in 1860, ushering in use of the most favored nation (MFN) principle to automatically extend to third parties tariff reductions that were signed between any two countries. France and Germany signed a treaty in 1861; a Franco-Prussian treaty was signed in 1862; Italy entered the 'network of Cobden-Chevalier

treaties' in 1863; Switzerland in 1864; Sweden, Norway, Spain, the Netherlands and the Hanseatic towns in 1865; and Austria in 1866. By 1877, less than two decades after the Cobden Chevalier treaty and three decades after British repeal, Germany had 'virtually become a free trade country'" (O'Rourke and Williamson 1999: 38-39, in places citing Bairoch 1989: 40-41). In some of these countries, the elites may have stood to gain from the ensuing trade liberalization. But in others, such as Germany, the position of the land-owning elite would have been much the same as that of Britain's, and they would only have conceded a move to free trade under the threat of revolution.

Much has been made of the fact that in mainland Europe the move towards free trade came later, was less decisive, and retrenched more quickly towards protectionism than in the UK. In much of Europe there was an increase in tariffs from the 1870s onwards, while Britain held on to free trade until the onset of the First World War. To explain this, let us make the simplifying assumption that Europe tended to have a comparative advantage in manufactures relative to the rest of the world and that, like in Britain, a land-owning elite existed in each country that favored protection. These differences in approach to trade policy can be explained partly in terms of the presence of the threat of revolution and partly by differences in the specific value of p^s required in each country to leave workers just indifferent between democracy and the status quo.

Let us assume, based on Tilly (1993), that the threat of revolution remained ever present in Europe throughout the period, meaning that the elite could use trade policy to maintain the status quo. This places emphasis onto explaining differences in trade policy in terms of differences in p^s across countries. The simplest argument would be that workers in mainland Europe placed a relatively low value on being able to set trade policy democratically in the future, reflected in a low value of δ, and giving rise to a relatively low value of p^s. Another factor would be that p^s was lower in mainland Europe than it was in Britain because urbanization rates were relatively low in mainland Europe, giving food prices a greater role in determining the income of a worker and hence the median voter. Seen in this light, the rise in tariffs in mainland Europe can be understood as being driven by the fall in wheat prices that resulted from the flood of wheat arriving in Europe from the US after 1870. Then if Proposition 1 dictates that over time p_t should be held constant at p_s, and if $p_s = p_t^m/p_t^f = p_t^m/(p_t^{fw}(1+\tau_t))$, where p_t^{fw} is the world price of

food and τ_t is an ad valorem tariff imposed on food to achieve p_t^f, then an increase in τ_t is required in response to a fall in p_t^{fw} in order to hold p_t^f constant.

Interestingly, the situation currently emerging in many developing countries has recently come to reflect that of industrial Europe in the middle of the 19th century. In particular, many of these countries are developing a comparative advantage in manufactures (Baldwin 2010). At the same time, the ruling elite have often maintained a significant interest in the natural resource/primary product sector. Then Proposition 1 could be used to explain the recent wave of trade liberalization in these countries as well.

3. The Specific Factors Model with Social Conflict

Now we will show that when the Stolper-Samuelson theorem fails to hold, there may be no incentive for the workers to mount a revolution. To do this, we will produce a second new model by combining a Specific-Factors model with the AR model of social conflict and franchise extension in much the same way we did above for the Heckscher-Ohlin model.

The changes relative to the model set out above concern the division of society into socioeconomic groups, the number of factors, and the production technology as it relates to factor use in production. Each citizen in the country is now placed in one of three (as opposed to two) socioeconomic groups: the capitalists, c, the landowners, (still e), or the workers, l. The mass of the total population is normalized to one as before, and the share of workers, landowners and capitalists in the population is fixed exogenously at ζ^l, ζ^e and $1-\zeta^e-\zeta^l$ respectively.

The economy is now endowed with a unit each of three (as opposed to two) primary factors: capital, K, labor, L, and land, T. Initially, all of the capital is distributed evenly among the capitalists, all of the land is distributed evenly among the landowners, with no capital or land belonging to the workers, while each worker is endowed with an equal share of the labor endowment. All members of each group are identical to one another as before and each group differs from the other only by its initial factor endowment. The return on capital is denoted by q_t in period t; the prices of the other two factors are denoted the same as previously.

The three factors are used in the production of two commodities, referred to as food and manufactures as before. Land is specific to the production of food while capital is specific to the production of manufactures. Labor is required in the production of both goods and can move freely between the two sectors. In all other respects the underlying structure of the economy is the same as previously.

Now consider an exogenous change of p_t; since the economic framework is a standard Specific-Factors model, we can immediately make use of standard results. It is well known that the Stolper-Samuelson Theorem fails to hold in this extended framework (Jones 1971). In particular:

$$\hat{q}_t > \hat{p}_t > \hat{w}_t > 0 > \hat{r}_t.$$

Given that we have maintained the assumption of boundary endowments in our Specific-Factors model as well, we can see straight away that capitalists gain in real terms from an increase in p_t while landowners lose. We can also see that the effect on workers is ambiguous. If their consumption consisted entirely of food their real income and hence their welfare would rise in response to an increase in p_t while if they consumed only manufactures the effect would be the opposite. Given that in general their consumption bundle would include both goods, without more specific information about the specification of preferences, the effect of a change in p_t on the real income and hence the welfare of workers is ambiguous.

Now let us once again endogenize the determination of p_t. In this model we will assume that capitalists and landowners represent two elite groups within society in that each can separately play the role that the (single) elite did in the Hecksher-Ohlin version of the model. At $t = 0$ nature assigns power to one of the elite groups, which then has exclusive control over trade policy. The other elite group is excluded from power. In the event of a revolution, workers are assumed to expropriate all capital and land (after which they install democracy). The elite group that is excluded from power does not participate in the revolution and stand to lose everything if one occurs. In all other respects the model remains the same as previously.

We can now see that under the Specific-Factors model, if capitalists were assigned power then they would tend to set a higher value of p_t than would land owners if they are assigned power. Maintaining the notation introduced earlier that p^{i*} denotes group i's

preferred price level, where now $i \in \{c, e, l\}$, we have that $p^{c*} > p^{e*}$. Most importantly, unlike in the Heckscher-Ohlin model, because here the Stolper-Samuelson theorem does not hold, we cannot say anything about the relationship between the preferred price level of the ruling elite and the workers unless the workers only consume one good. If the landowners held power they would tend to set p^{e*} relatively low. If workers only consumed food then they would want food to be as cheap relative to their wages (and the price of manufactures) as possible. Thus $p^{e*} < p^{l*}$ and there would, given $\rho > \overline{\rho}$, be scope for the landowners to prevent a revolution by effecting redistribution, setting p^s such that $p^{e*} < p^s \leq p^{l*}$. But if workers only consumed manufactures then $p^{e*} = p^{l*}$ and there would be no incentive for workers to mount a revolution in the first place. In general, with workers consuming both goods, either situation may arise.

3.1. Worker Preferences over Trade Policy in the Specific-Factors Model

Following Ruffin and Jones (1977), we can in fact go further and characterize the preference of workers over trade policy in the Specific-Factors model. This in turn will enable us to provide a set of sufficient conditions for the threat of revolution to occur over trade policy, even when the Stolper-Samuelson theorem fails to hold. To do so, it will be helpful to introduce some additional notation. Let ψ_t be the relative rise in the wage rate when p_t increases by 1 percent: $\psi_t \equiv \hat{w}_t/\hat{p}_t$. And let θ be the fraction of any given individual's expenditures devoted to manufactures. Then the net change in the real income of workers as a result of an increase in p_t is

$$\hat{y}_t^l = (\psi_t - \theta)\,\hat{p}_t. \tag{3.1}$$

If $\psi_t \in (0, 1)$, the effect of a change in $\hat{p}_t$ on the real income of workers is ambiguous. In the 2×2 Hecksher-Ohlin model, $\psi_t > 1$ and from this the effect of a change in p_t on workers' real income is unambiguously positive. But as we shall see, in the Specific Factors model $\psi_t \in (0, 1)$, which is the root of the ambiguity revealed in the previous subsection.

The reason for the differences between the possible ranges of values of ψ_t in the respective models is that, by construction, each good must be biased towards one factor in the 2×2 Hecksher-Ohlin model. This implies that one good must be biased towards

labor; in our specification we chose this to be manufactures. On the other hand, in the Specific-Factors model manufactures can be 'unbiased with respect to labor'. Making this precise, manufactures are said to be unbiased with respect to labor if the relative change in the wage rate, $\hat{w}_t$, brought about by an increase in p_t is:

$$\hat{w}_t = \alpha^K \hat{q}_t + \alpha^L \hat{w}_t + \alpha^T \hat{r}_t;\ \alpha^I > 0,\ \sum \alpha^I = 0,$$

where α^I, $I \in \{K, L, T\}$, is the distributive share of factor I in national income. Intuitively, manufactures are unbiased with respect to labor when the change in the wage rate in response to a change in p_t is exactly equal to the weighted average of the change in all factor prices. Manufactures are biased towards labor if the change is greater than, or biased away from labor if the change is less than, the weighted average of the change in all factor prices.

We will now make use of that fact that, for the Specific Factors model and a wide variety of general equilibrium models, the output share weighted average of relative changes in commodity prices equals the distributive share weighted average of relative factor prices:

$$\alpha_f \hat{p}_t^f + \alpha_m \hat{p}_t^m = \alpha^K \hat{q}_t + \alpha^L \hat{w}_t + \alpha^T \hat{r}_t,$$

where α_j $j \in \{f, m\}$ denotes the fraction of the national income represented by the production of good j. This condition is obtained by differentiating the competitive profit conditions and then aggregating across sectors. Following the approach that we have taken throughout the paper of taking variation of p_t to represent changes of p_t^m relative to p_t^f, or equivalently changing p_t^m while holding p_t^f constant, in the unbiased case it follows from the previous two equations and the definition of ψ_t that

$$\psi_t = \alpha_m.$$

We can now use this result to demonstrate unbiasedness in the Specific Factors model. For that model, following Jones (1971), ψ_t takes the form

$$\hat{w}_t = \psi_t \hat{p}_t = \lambda_m((\eta_m/\theta_{Km})\ /\ \big(\lambda_f(\big(\eta_f/\theta_{Tf}\big) +\ \lambda_m((\eta_m/\theta_{Km})\big) \cdot \hat{p}_t.$$

The λ_j, $j \in \{f, m\}$, denote the fraction of the labor force used to produce good j. The θ_{Ij} indicate the distributive share of the specific factor in the jth sector. Since the η_j

express the elasticity of substitution between labor and the specific factor in sector j, the expression η_j/θ_{Ij} is the elasticity of labor's marginal product curve in the jth sector. Thus the denominator of ψ_t is the the economy-wide average over both sectors of labor's marginal product curve in each sector.

Manufactures are unbiased with respect to labor if:

(i) The elasticity of the marginal product of labor schedule for manufactures, η_m/θ_{Km}, is equal to the economy-wide average;

(ii) Manufactures are neither more nor less labor intensive than the economy as a whole. That is, the fraction of the labor force used to produce manufactures, λ_m, is equal to the fraction of national income represented by the value of production in manufactures, α_m.

Assumption (i) implies that $\psi_t = \lambda_m$ and assumption (ii) states that $\lambda_m = \alpha_m$. Thus manufactures are unbiased with respect to labor.

Now let us consider the implications of unbiasedness. Using the fact that $\psi_t = \alpha_m$ in (3.1), we have that $\hat{y}_t^l = (\alpha_m - \theta)\,\hat{p}_t$, where $-(\alpha_m - \theta)$ is the fraction of national income, Y, that is comprised of imports of manufactures, M_m. So for the neutral case, (3.1) is equivalent to:

$$\hat{y}_t^l = -(p_m M_m/Y)\,\hat{p}_t. \tag{3.2}$$

Let us maintain the (implicit) long-run assumption that trade accounts are balanced. This implies that if a country exports a good then it is because it has a comparative advantage in that good. Then we can state the main proposition of Ruffin and Jones (1977) as it applies in the present context as follows. If manufactures are unbiased with respect to labor, then a rise in the price of manufactures raises the real income of workers if and only if the country has a comparative advantage in manufactures. A rise in the price of manufactures lowers the real income of workers if and only if the country has a comparative advantage in food.

Applying this proposition to tariff theory reveals how the implications of trade policy intervention in the Specific Factors model can differ from those in the Heckscher-Ohlin model. If manufactures are unbiased with respect to labor, and if the country has a com-

parative advantage in manufactures, then an export tax on manufactures or an import tariff on food would lower the domestic relative price of manufactures, lowering workers' real income and making them worse off. If landowners were in power then the prediction would be just as in the Heckscher-Ohlin model developed above: $p^{e*} < p^{l*}$. The landowners favor protection while the workers favor free trade. Under these circumstances, given the opportunity to mount a revolution workers would take it. But, knowing this, the elite would attempt to use trade policy to defuse the incentive to mount a revolution just as in the Heckscher-Ohlin model.

Now assume that the country has a comparative advantage in food. Then an export tax on food would lower the domestic price of food by the amount of the tax and hence raise the relative price of manufactures. And similarly for an import tariff on manufactures. By the Ruffin-Jones proposition, either intervention would lower the real income of workers and hence make them worse off. So, unlike in the Heckscher-Ohlin model, under the Specific Factors model where manufactures are unbiased with respect to labor, workers always favor nonintervention in trade policy. This difference underpins the fact that the Stolper-Samuelson theorem can fail to hold in the Specific-Factors model. Since the landowners favor non-intervention as well and hold power, we have that $p^{e*} = p^{l*}$. Thus, there is no incentive for the workers to mount a revolution in order to seize control of trade policy.

The specific predictions regarding the relationship between comparative advantage and the predictions over whether or not there is an incentive for workers to mount a revolution are reversed when capitalists hold power, but the basic point remains the same. Under the Specific Factors model the incentives of the ruling elite to set trade policy, now the capitalists, will only conflict with those of the workers if labor is unbiased with respect to food and if the country has a comparative advantage in food. The foregoing discussion gives us the following general result:

Lemma 2. *If the elite do not (do) own the specific factor that is used intensively in the good for which the country has a comparative advantage, and if that good is unbiased with respect to labor, then the interests of the ruling elite and the workers over trade policy conflict (are aligned). Consequently, there exists (does not exist) an incentive to mount a revolution over trade policy.*

We can see that the implications of Lemma 2 map into our analysis of the incentives to mount a revolution formalized in Proposition 1. When there exists an incentive to mount a revolution, then the interactions between the ruling elite and the workers in the Specific Factors model are exactly the same as those in the Heckscher-Ohlin model. What we gain from Lemma 2 is an insight into how relaxing the conditions for the Stolper-Samuelson theorem to hold can in turn remove the incentive to mount a revolution.

It is clear that the assumption of neutrality plays an important role in Lemma 2. It essentially guarantees that the autarky price of manufactures coincides with the point at which $\psi_t = \theta$. By (3.2), this guarantees a positive relationship between $\hat{p}_t$ and $\hat{y}_t^l$ whenever the country has a comparative advantage in manufactures and a negative relationship otherwise, in turn implying that workers dislike trade policy intervention and contravening the Stolper-Samuelson theorem. It is tempting to think that all one needs to do to restore the clear Stolper-Samuelson predictions in the Specific-Factors model is to assume that manufactures are biased towards labor. But this is not sufficient. To see why, focus on the case where manufactures are biased towards labor because they are labor intensive (as in our Heckscher-Ohlin model). This would increase ψ_t at each price, p_t, implying that $\psi_t > \theta$ in autarky. Consequently, by (3.1), at a world price just below the autarky price it would be possible to have a positive relationship between $\hat{y}_t^l$ and $\hat{p}_t$ when manufactures are imported; the relationship associated with the Stolper-Samuelson theorem. However, in general it should always be possible to find a world price sufficiently low that the negative relationship that holds under neutrality would be restored.[8] So in general there would be an ambiguous relationship between $\hat{y}_t^l$ and $\hat{p}_t$ and hence an ambiguity over workers' preferences over trade policy. Neither is it possible to make manufactures sufficiently labor intensive to rule out this ambiguity completely because as we have already established, in the Specific Factors model $\psi_t \in (0, 1)$ while the ambiguity is removed in the Heckscher-Ohlin model by the fact that $\psi_t > 1$.

From this discussion we can see that it is not possible to establish a set of necessary conditions for a revolution over trade policy under the Specific-Factors model. But a set of sufficient conditions are possible, and are presented in the following result. Before stating the result, we need to introduce modified versions of A1 and A2 that accommodate the

[8] This property is guaranteed by our assumption of homotheticity; see Ruffin and Jones (1977), fn 4.

extended structure of the Specific-Factors model:

A1′. Given (a unique) p^{l*}, which gives rise to w^{l*}, r^{l*} and q^{l*} in competitive equilibrium, assume that $\overline{\beta} \in (0,1)$ is sufficiently small that $\overline{\beta}\left(\left(w^{l*}+r^{l*}+q^{l*}\right)/\zeta\right) < w^{l*}/\zeta$.

A2′. Given (unique) p^{c*}, p^{e*} and p^{l*}, assume $\overline{\beta}$ is sufficiently large that $v\left(p^{l*}, \overline{\beta}\left(\left(w^{l*}+r^{l*}+q^{l*}\right)/\zeta\right)\right) > v\left(p^{e*}, w^{e*}/\zeta\right)$ but not so large as to violate A1. Given this value of $\overline{\beta}$, assume that δ is sufficiently high that the revolution constraint is satisfied.

The following result summarizes the discussion above.[9]

Proposition 2. *Assume A1′ and A2′ and that the economy is characterized by the Specific-Factors model. Also assume that the elite do not own the specific factor that is used intensively in the good for which the country has a comparative advantage, and that this good is unbiased with respect to labor. Then for $\rho \neq \overline{\rho}$ there exists a unique pure strategy Markov Perfect Equilibrium wherein*

1. *If $\rho < \overline{\rho}$ then the elite will respond to the threat of revolution by extending the franchise.*
2. *If $\rho > \overline{\rho}$ then the elite will effect temporary redistribution using trade policy in response to the threat of revolution.*

If the elite do own the specific factor that is used intensively in the good for which the country has a comparative advantage (and if that good is unbiased with respect to labor) then there does not exist an incentive to mount a revolution over trade policy.

This result emphasizes the relationship between the specific factor owned by the elite and the intensity of its use in production. It is when the elite does not own the factor that is used intensively in the good for which the country has a comparative advantage that there is a threat of revolution over trade policy. Conversely, interests between the workers and the elite are aligned if the elite group who hold power own the factor that is used

[9]Note that the formal representations of equilibrium path (and off equilibrium path) strategies is suppressed in the statement of this result. The reason is that they conform precisely to the formal statement of these strategies in Proposition 1.

intensively in the good for which the country has a comparative advantage. This reveals an interesting alternative to the extension of the franchise as a way to defuse the incentive to mount a revolution. A ruling elite who faced this threat could simply hand over power to the other elite, without necessarily extending the franchise. The result can thus be used to shed further light on the rationale behind repeal of the Corn Laws. Within a month of gaining repeal, the Peel-lead Conservative government fell to the Whigs, who represented the interests of capital in the House of Commons. The Conservatives subsequently remained out of power for decades. Given the disastrous political fall-out from repeal, why did Conservatives in both Houses of Parliament support it? Proposition 2 suggests that triggering a transfer of power from the Conservatives to the Whigs may have been a way of maintaining political stability under the threat of revolution.

4. Conclusions

In this paper, we have shown that the conditions required for the Stolper-Samuelson theorem to hold, embodied by the 2×2 Heckscher-Ohlin model, represent the key components in a set of sufficient conditions for workers to have an incentive to mount a revolution, but also for the ruling elite to offset its occurrence using trade policy. We have explored these sufficient conditions by relaxing a key assumption required for the Stolper-Samuelson theorem to hold, moving from the Heckscher-Ohlin model to the Specific-Factors model. In doing so we showed that the incentive to mount a revolution over trade policy could be removed. In the context of the latter model, we then established a different set of sufficient conditions for there to be a threat of revolution over trade policy. This theory was used to explain the repeal of Britain's Corn Laws and trade liberalization in mainland Europe in the middle of the 19th century, as well as the recent wave of trade liberalization in the developing world.

Two main questions are provoked by the framework presented in this paper. The first is how does this theory interact with previous theories of protectionism? The second concerns the dynamic process governing the interaction between trade liberalization and eventual franchise extension. Let us briefly discuss the scope for future research in each of these areas in turn.

As discussed in the introduction, previous theories of protectionism tended to focus on efforts by special interest groups to lobby the government for their preferred trade policy. A combination of the theory developed in the present paper and earlier theories would facilitate an even more nuanced account of the variation in tariff rates across countries. Following the literature initiated by Goldberg and Maggi (1999), there would also be scope to test the relative importance of the respective theories of protectionism against the data.

It would be interesting to examine the interaction over time of the incentive to use tariffs to defuse the threat of revolution against the broader impetus to extend the franchise. For example, technological change could alter the relative payoff to the workers of setting the tariffs over time under democracy versus maintaining the status quo, requiring an ever decreasing tariff in order to maintain the status quo. This in turn might help to explain why tariff reduction, both through the 19th Century and nowadays, is often gradual.

A. Appendix

Proof of Lemma 1. Multiplying the revolution constraint through by $(1-\delta)$, it can be rewritten as

$$v\left(p^{l*}, \overline{\beta}\left(\left(w^{l*}+r^{l*}\right)/\zeta\right)\right) > (1-\delta)\, v\left(p^{l*}, w^{l*}/\zeta\right) + \delta v\left(p^{e*}, w^{e*}/\zeta\right).$$

By A1, $\overline{\beta}$ is chosen to be sufficiently small that $v\left(p^{l*}, w^{l*}/\zeta\right) > v\left(p^{l*}, \overline{\beta}\left(\left(w^{l*}+r^{l*}\right)/\zeta\right)\right)$. But by the Stolper-Samuelson Theorem with boundary endowments and homothetic preferences, $v\left(p^{l*}, w^{l*}/\zeta\right) > v\left(p^{e*}, w^{e*}/\zeta\right)$. So it is possible to choose $\overline{\beta}$ sufficiently large that $v\left(p^{l*}, \overline{\beta}\left(\left(w^{l*}+r^{l*}\right)/\zeta\right)\right) > v\left(p^{e*}, w^{e*}/\zeta\right)$ while still maintaining $\overline{\beta}$ small enough to satisfy A1. Thus we have established that the revolution constraint holds for $\delta = 1$. By continuity and monotonicity of the right hand side of the revolution constraint in δ, it holds for values of δ sufficiently close to 1 as well. The value of δ must be sufficiently close to 1 because the right hand side of the revolution constraint approaches $v\left(p^{l*}, w^{l*}/\zeta\right)$ as δ approaches zero which, by A1, is greater than $v\left(p^{l*}, \overline{\beta}\left(\left(w^{l*}+r^{l*}\right)/\zeta\right)\right)$, violating the revolution constraint. □

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