



Contents lists available at ScienceDirect

## Journal of International Economics

journal homepage: [www.elsevier.com/locate/jie](http://www.elsevier.com/locate/jie)Escaping a protectionist rut: Policy mechanisms for trade reform in a democracy<sup>☆</sup>Emily Blanchard<sup>a,\*</sup>, Gerald Willmann<sup>b</sup><sup>a</sup> Tuck School of Business at Dartmouth, 100 Tuck Hall, Hanover, NH 03755, United States<sup>b</sup> Department of Economics, Catholic University of Leuven, Naamsestraat 69, 3000 Leuven, Belgium

## ARTICLE INFO

## Article history:

Received 7 January 2010

Received in revised form 8 March 2011

Accepted 10 May 2011

Available online 19 May 2011

## JEL classification:

F13

F16

D72

E60

## Keywords:

Dynamic political economy

Trade policy

Skill acquisition

Politically stable policy paths

Referenda

## ABSTRACT

This paper analyzes the dynamics of trade policy reform under democracy. In an overlapping generations model, heterogeneous agents may acquire skills when young thereby determining the skill composition of their cohort. Current and anticipated trade policies influence education decisions and thus voters' trade policy preferences. We show that there may exist two political steady states: one protectionist and one liberal. Transition from the former to the latter can be achieved by government announcements, temporary educational subsidies, or tariff liberalization by trading partners, but generally not by transfer payments to adversely affected workers. We find additionally that reform is politically feasible only if the proposed liberalization is sufficiently large, suggesting that radical reform may be necessary for escaping a protectionist political rut.

© 2011 Elsevier B.V. All rights reserved.

## 1. Introduction

The political process of trade liberalization is inherently dynamic, the path to reform characterized by difficult and often unpopular labor market adjustments that may give rise to political foot dragging or even backsliding. In the presence of populist voter pressure, proposed liberalization programs that commence with great fanfare may easily (and frequently do) succumb to public backlash. The anti-NAFTA political rhetoric in the most recent U.S. presidential cycle is only the latest manifestation; history is rife with episodes of protectionist fervor, from the 19th century British Corn Laws to the interwar period early in the last century and the notoriously volatile trade policy cycles of twentieth century Latin America.<sup>1</sup> In democratic political environments, which are necessarily subject to constant legislative reevaluation, generational differences, evolving expectations, and individual workers' abilities to adapt to changing market

conditions surely are paramount in determining the ultimate success or failure of liberalization efforts.

Our paper takes a new modeling approach to highlight the potential importance of voters' future expectations and intergenerational differences in a dynamic political economy model, while maintaining a parsimonious analytical structure customary to the trade literature. We develop a two period overlapping generations (OLG) model with endogenous skill acquisition in which agents vote every period on a referendum to adjust the current trade policy or to maintain the status quo. When deciding whether to acquire skills, heterogeneous agents within each generational cohort take into account current and expected trade policies. The model exhibits a feedback mechanism in which past trade policy determines the skill composition of the older generation, and hence the size of the political constituencies for and against trade reform. This key mechanism is consistent with empirical evidence: [Hickman and Olney \(2010\)](#) and [Atkin \(2010\)](#) both find support for Stolper–Samuelson effects on skill acquisition (in the U.S. and Mexico, respectively) and [Scheve and Slaughter \(2001\)](#) find that voters' support for trade barriers is significantly and negatively correlated with skill level.<sup>2</sup>

Given the population's skill composition at the time of the vote and the expected trade regime in the future, we find the potential for multiple political steady states, which are defined as economic

<sup>☆</sup> We are grateful to Robert Staiger and two anonymous referees, as well as colleagues and seminar participants, for suggestions that greatly improved the paper. Funding from the Bankard Fund for Political Economy is gratefully acknowledged.

\* Corresponding author. Tel.: +1 434 924 3607.

E-mail addresses: [emily.blanchard@tuck.dartmouth.edu](mailto:emily.blanchard@tuck.dartmouth.edu) (E. Blanchard), [gerald.willmann@econ.kuleuven.be](mailto:gerald.willmann@econ.kuleuven.be) (G. Willmann).

<sup>1</sup> See, for example, [Schonhardt-Bailey \(2006\)](#), [Irwin \(1998\)](#), and [Lederman \(2005\)](#) respectively for the economic history of trade policy under the Corn Laws, the Smoot–Hawley era, and 20th century Chilean political reforms.

<sup>2</sup> [Beaulieu and Magee \(2004\)](#) show that industries' net trade orientation serves as a strong predictor for labor union PAC contributions.

equilibria under which the majority will vote to maintain the status quo trade policy.

When the model generates multiple political steady states, voters can get stuck in a “protectionist rut” even though the country as a whole would be better off under the more liberal regime, itself a politically sustainable equilibrium.<sup>3</sup> Given that there are efficiency gains from freer trade, transition from the relatively protectionist regime to a more liberal policy should be feasible. We show that transition can be achieved by credible policy announcements as well as educational subsidies that tilt the balance toward the more liberal policy path. Traditionally used temporary transfer payments, on the other hand, may be counter-productive if the compensation scheme adversely affects workers' ex ante skill acquisition decisions.<sup>4</sup> We find moreover that the political feasibility of transition increases in the magnitude of the tariff liberalization, and also in the presence of “reciprocal” reforms by trading partners. Radical policy proposals and multilateral liberalization agreements thus may be more likely to be approved than small or unilateral reforms. Importantly, successful transition mechanisms generally can be temporary; the additional cost of educational subsidies, or even trading partners' reciprocal reforms, thus may need to persist only for a short time to achieve permanent trade policy reform.

We find these policy prescriptions particularly relevant in light of a number of important trade policy episodes in which the feedback mechanism identified by our model seems to be a central feature. For instance, just as the Napoleonic wars are widely believed to have played a key role in ushering in Britain's Corn Laws, the interruption of trade during the second world war caused massive expansion in the manufacturing sector in much of Latin America, leaving a legacy of political support for import-substitution policies throughout the region. Similarly, the failed experiment of the Jefferson trade embargo of 1807 led to dramatic changes in the U.S. economy and created a powerful protectionist constituency that persisted long after the repeal of the embargo itself. Working in the opposite direction, Chile's controversial dictator Augusto Pinochet unilaterally imposed an open trade regime to a previously highly protectionist country, but after his ouster and the return to democratic rule in 1990 there was no real political pressure to go back to high tariffs. In each of these instances, an exogenous shift in the underlying economic landscape left a lasting impression on trade politics and arguably induced an entirely new self-sustaining policy equilibrium.

Our analysis continues a select tradition in analyzing dynamic aspects of endogenous trade policy. Of the literature that centers on the role of individuals' skill acquisition choices in policy outcomes, our paper marks a number of important differences.<sup>5</sup> First, in contrast to [Staiger and Tabellini \(1987\)](#), who highlight the importance of time consistency under a benevolent government with redistributive aims, we rely on a voting framework without commitment and are still able to explain positive levels of protection.<sup>6</sup> And unlike [Fernandez and Rodrik \(1991\)](#), who in their seminal contribution show how individual

uncertainty can give rise to status-quo bias, we are able to establish such a bias in a deterministic setting under perfect information. As we do, [Krishna and Mitra \(2008\)](#) find the possibility of multiple trade policy equilibria<sup>7</sup>; their two country median voter setting is static, however, and does not give rise to multiple political equilibria in a unilateral context as ours does. Finally, in an important recent contribution, [Davidson et al. \(2007\)](#) show that the order in which the median voter decides on trade liberalization as well as accompanying compensatory transfer scheme can fundamentally change the policy outcome. While sequencing is a clever way to endogenize the second policy dimension, the combined decision on the policy mix remains static.<sup>8</sup>

Our approach and results in this paper, though novel to the trade literature, are motivated in part by recent work in macroeconomics. In particular, our approach is similar to that in [Hassler et al. \(2003a, 2007\)](#) who analyze domestic redistributive policies, and find, as we do, the potential for multiple equilibria.<sup>9</sup> Our model differs from this earlier work in a number of respects. Perhaps most notably, intergenerational political frictions in voting are a key element in our framework, whereas previous studies assume that the young do not vote, so that the median voter does not have a stake in the future economy.<sup>10</sup>

Beyond the realm of political economy, our work relates to important contributions to the broader trade literature that use a dynamic framework to analyze agents' decisions, taking policy as given. [Findlay and Kierzkowski \(1983\)](#) present an OLG model in continuous time where agents decide on human capital acquisition, and [Borsook \(1987\)](#) introduces heterogeneous agents in such a framework, which comes close to the economic side of the model we employ in this paper. [Matsuyama \(1992\)](#) uses a continuous time OLG setup where agents, whose comparative advantage differs across sectors, decide up-front which sector to enter depending on current and future trade policies. Though not a trade paper per se, [Eicher \(1996\)](#) analyzes similar issues in his insightful study of the interaction between skill acquisition decisions and endogenous technological innovation. In addition to OLG models, there are numerous studies in trade that consider a finite sequence of time periods where heterogeneous agents can make human capital investments. [Bougheas and Riezman \(2007\)](#) analyze how the distribution of human capital determines the respective trade policies of two countries. [Willmann \(2004\)](#) shows how the attempt to compensate the losers from liberalization can undermine the gains from trade due to strategic underinvestment in human capital, while [Long et al. \(2007\)](#) analyze how trade liberalization affects the acquisition of sector specific human capital. All of these studies, however, stop short of endogenizing trade policy.

The paper proceeds as follows. [Section 2](#) describes the model and establishes the conditions under which multiple political steady states exist. [Section 3](#) then describes the potential for transition between steady states, focusing first on the role of expectations and then on active policy prescriptions for inducing reform. [Section 4](#) concludes.

<sup>3</sup> This finding is reminiscent of [Basu and Van \(1998\)](#), who demonstrate the potential for multiple equilibria in the context of child labor, though in their model multiplicity arises via labor markets rather than through the political system.

<sup>4</sup> This finding is similar to that of [Magee \(2003\)](#), though the mechanism is very different; in his variant of the [Grossman and Helpman \(1994\)](#) Protection for Sale model, transfer programs may reduce policy makers' incentives to lower tariffs by reducing the size of the import competing industry, and thus the production distortion induced by a tariff.

<sup>5</sup> The balance of the existing work concentrates on the decisions of firms and on lobbying. For important early contributions, see [Cassing and Hillman \(1986\)](#), [Brainard and Verdier \(1994\)](#), and [Brainard and Verdier \(1997\)](#). More recently, [Maggi and Rodríguez-Clare \(1998, 2007\)](#) endogenize the commitment to trade liberalization in a lobbying game and subsequently use their approach to propose a novel theory of trade agreements. [McLaren \(2002\)](#) shows how prior investment decisions can lock countries into a preferential, rather than multilateral, liberalization policy.

<sup>6</sup> Our political framework thus follows the tradition of [Mayer \(1984\)](#), who first developed the median voter model in context of trade policy.

<sup>7</sup> [Chisik \(2003\)](#) and [Moro and Norman \(2004\)](#) both present models where asymmetric information – regarding product quality in the former, and workers' skill in the latter – can give rise to multiple trade policy equilibria. In our model, by contrast, multiple equilibria arise even under perfect information.

<sup>8</sup> Also different, their model treats individuals' industry affiliation as exogenous whereas skill acquisition – and thus implied trade policy preferences – is endogenous in our framework.

<sup>9</sup> Also related are quantitative models in [Bassetto \(1999\)](#), [Saint Paul \(2001\)](#), [Krusell and Rios-Rull \(1996\)](#), and [Krusell et al. \(1996\)](#); the recent work by [Ortega \(2004\)](#), who uses a similar approach to analyze the nexus between immigration policy and redistribution, (though skill acquisition is entirely stochastic in his model); and [Glomm and Ravikumar \(1995\)](#), [Saint Paul and Verdier \(1997\)](#), and [Benabou \(2000\)](#), which also feature a feedback loop between public policy and individual behavior.

<sup>10</sup> In giving suffrage to the young generation, our model both highlights the role of intergenerational voting blocks and permits a number of interesting and relevant extensions, such as differential voter turnout across generations or population growth. Moreover, allowing the young to vote eliminates the potential for cyclical sunspot equilibria. (see [Section 2.2](#).)

## 2. A model of political stasis

The model is designed to capture a dynamic environment in which both current and future trade policies influence individuals' skill acquisition decisions and voting behavior. Our OLG approach highlights the importance of the status quo policy in determining the existing skill composition of workers – and thus the trade policy preferences of the voting majority – and the concomitant intra- and inter-generational political friction borne of different abilities to adjust between unskilled and skilled work. The model allows formal evaluation of how voters' preferences and choices depend on current and expected trade policies, representing how voting populations evolve in response to changing economic conditions.

We begin in Section 2.1 by characterizing the economic equilibrium in terms of the skill composition and production levels that would result from an exogenous time path of tariffs; an economic steady state is then just the economic equilibrium that would obtain under a given constant exogenous tariff level. Section 2.2 then endogenizes the political process to evaluate the existence, properties, and potential multiplicity of political equilibria and political steady states. As in Krishna and Mitra (2008) we first develop the model without inclusion of tariff revenue to simplify the analytical exposition. Appendix A2 demonstrates the robustness of the results to lump sum redistribution of tariff revenue.<sup>11</sup>

### 2.1. The model economy

The model consists of a small open economy that may produce, consume, and trade two goods: a skill-based good, S, which requires skilled labor to produce, and a basic good, U, produced using unskilled labor. Let good S be the economy's natural export good (i.e. take the perspective of an industrialized country).<sup>12</sup> Designating U as numéraire, the domestic relative price of good S then is given by  $p \equiv \frac{p^w}{\tau}$ , where  $p^w$  represents the exogenous world relative price and  $\tau$  is defined as one plus the ad-valorem tariff on the basic good. Both goods are produced under perfect competition with constant returns to scale technologies. There is no uncertainty in the model and borrowing and lending are ruled out.

The economy's population consists of a continuum of agents with ex-ante heterogeneous natural abilities and rational expectations with perfect foresight.<sup>13</sup> Agents live for two periods; thus at any point in time, two generations, the 'young' and the 'old', comprise the total population. Every generation is assumed to be the same size, with mass normalized to one. Individuals of each generation are indexed by  $a \in [0, 1]$  according to ability level. We assume that within each generation, the distribution of ability levels is uniform over the unit interval. Agent  $a=0$  is the least able of her generation, and agent  $a=1$  the most able.

Every agent is endowed with one unit of labor in each period of life. At birth, each individual chooses either to remain unskilled for her lifetime or to acquire skills at a constant fixed education cost  $c \in [0, 1]$  units of labor. If an agent elects to remain unskilled, she inelastically supplies one unit of unskilled labor in each period of her life. If instead she chooses to earn an education, she supplies the  $(1-c)$  units of unskilled labor that remain after paying for education when young, and subsequently  $(1+a)$  efficiency units of skilled labor when old. Comparing the sectoral mobility of both age groups, note that agents

are assumed to be free to choose between sectors when young by choosing education, while they are sectorally immobile when old.<sup>14</sup>

We assume an extreme form of factor specificity in the production functions for both goods: the basic good is produced only from unskilled labor and the skill-based good solely from skilled labor.<sup>15</sup> While our assumption that each good uses only one factor of production simplifies the analysis, this is not a necessary condition for our results.<sup>16</sup>

An agent will acquire skills only if doing so maximizes her lifetime indirect utility. Preferences are identical across individuals and functionally separable across time. Let each agent's lifetime utility function be given by:

$$u(x_u^y, x_s^y) + \beta u(x_u^o, x_s^o), \quad (2.1)$$

where  $\beta > 0$  represents the intertemporal discount factor,  $x_s^y(x_u^y)$  denotes the individual's consumption of good S (U) when she is young, and  $x_s^o(x_u^o)$  her consumption of good S (U) when old. We assume intratemporal utility is a function of current consumption, given by  $u(x_u, x_s) \equiv x_s^\alpha x_u^{1-\alpha}$ , so that the corresponding within-period indirect utility function is  $v(p, I) \equiv Kp^{-\alpha} I^\alpha$ , where  $K \equiv \alpha^\alpha (1-\alpha)^{1-\alpha} > 0$ ,  $I$  denotes current nominal income, and  $\alpha \in (0, 1)$ . A key advantage of this functional form is that it allows us to focus on the skill acquisition decision by abstracting from consumption smoothing.<sup>17</sup>

By choice of units, one unit of unskilled labor produces exactly one unit of the basic good, so that the nominal wage to unskilled labor is normalized to one for all agents. From the assumption that one unit of skilled labor by agent  $a$  produces  $(1+a)$  units of good S, perfect competition implies that the nominal skilled wage to agent  $a$  at time  $t$  is  $(1+a)p_t$ . Thus, as a function of current and future prices,  $p_t$  and  $p_{t+1}$ , a given agent  $a$  will acquire skills if and only if:

$$v(p_t, 1-c) + \beta v(p_{t+1}, (1+a)p_{t+1}) \geq v(p_t, 1) + \beta v(p_{t+1}, 1). \quad (2.2)$$

From Eq. (2.2) and the functional form of the sub-utility function we can define the threshold agent,  $\hat{a}_t$ , under a diversified equilibrium as the member of the young generation at time  $t$  who is just indifferent between remaining unskilled and getting an education given the discount rate, the cost of education, the preference parameter  $\alpha$ , and current and anticipated tariffs:

$$\hat{a}_t = \hat{a}(\tau_t, \tau_{t+1}) \equiv \max \left\{ 0, \frac{\beta + c \left( \frac{\tau_t}{\tau_{t+1}} \right)^\alpha}{\beta p^w} \tau_{t+1} - 1 \right\}. \quad (2.3)$$

The threshold agent (and thus the fraction of unskilled workers in equilibrium) is increasing with the cost of education,  $c$ , decreasing with the relative price of the skill-based good,  $p^w$ , and increasing with both the future and current tariff levels (the former is obvious, and the latter reflects a higher opportunity cost of education). The greater the weight individuals place on the future relative to the present ( $\beta$ ) the lower is  $\hat{a}$  and thus the smaller the fraction of unskilled workers. Note that the corner solution in which all agents acquire skills,  $\hat{a} = 0$ , does

<sup>11</sup> Redistribution through non-uniform tariff revenue rebates is analytically equivalent to the tax and transfer schemes discussed in Section 3.

<sup>12</sup> All else equal, the assumption of comparative advantage in the skill based good implies that the home country has a lower cost of skill acquisition than its trading partners since the autarkic relative price of the skill based good is increasing in the cost of education; see Appendix Eq. (A1.3).

<sup>13</sup> Uncertainty over future policy outcomes would strengthen our results further, compounding our findings by the uncertainty-driven status quo bias mechanism in Fernandez and Rodrik (1991).

<sup>14</sup> Falvey et al. (2010) develop a model in which agents can earn an education at any point along a continuous time dimension, and show that sectoral mobility does decrease in age.

<sup>15</sup> Unskilled workers cannot produce skill-based goods, and no established skilled (second generation) worker would revert to unskilled good production as long as the skill premium is positive, which is implied in autarky by the Cobb–Douglas structure of preferences assumed momentarily, and under trade by the assumption that S is the natural export good.

<sup>16</sup> As in Matsuyama (1992) our assumption simplifies the analysis by reducing the dimensionality of the price vector and relieves us of resorting to the Stolper–Samuelson result, which would deliver the same results under a more general production structure.

<sup>17</sup> Under constant marginal utility of income, agents' skill acquisition decisions are orthogonal to savings and wealth. Furthermore, note that the presence of a perfect credit market would also silence the effect of a consumption smoothing motive.

not imply a specialized economy (as long as  $c < 1$ ), since all workers are assumed to be unskilled while young. The assumption that the country has comparative advantage in production of the skill-based good ensures that  $\hat{a} < 1$  in equilibrium.

Based on the critical value in Eq. (2.3), we can summarize the educational decision of any agent as follows:

**Proposition 2.1.** *An agent of generation  $t$  with ability level  $a \in [0, 1]$  remains unskilled for life if  $a \leq \hat{a}(\tau_t, \tau_{t+1})$ , and acquires skills otherwise.*

Because each generation of agents is mapped to the unit interval with a uniform distribution,  $\hat{a}$  also equals the proportion of unskilled workers in each generation. The proportion of generation  $t$  that acquires skills is then  $\theta_t \equiv 1 - \hat{a}_t$ . Output of each good at time  $t$ ,  $q_t^s$  and  $q_t^u$ , can be written as a function of the skill composition of the old (generation  $t-1$ ) and the young (generation  $t$ ). The following lemma summarizes the equilibrium outcome of the model developed so far, taking tariff policy as exogenous.

**Lemma 2.1.** *As a function of an exogenous tariff sequence, the quantities of each good produced in every period  $t$  are given by:*

$$q_t^u = q^u(\theta_{t-1}, \theta_t) = 2 - \theta_{t-1} - c\theta_t, \quad (2.4)$$

$$q_t^s = q^s(\theta_{t-1}) = \int_{\hat{a}_{t-1}}^1 (1 + a) da = 2\theta_{t-1} - \frac{\theta_{t-1}^2}{2}, \quad (2.5)$$

where each cohort's skill composition is given by:

$$\theta_t = \theta(\tau_t, \tau_{t+1}) = 2 - \frac{\beta + c \left( \frac{\tau_t}{\tau_{t+1}} \right)^\alpha}{\beta p^w} \tau_{t+1} \forall t. \quad (2.6)$$

Note that we suppress the parameters  $(p^w, \beta, c, \alpha)$ , since they are assumed to be fixed and exogenous.

Given our assumption of a small open economy, and hence exogenous world market prices, solving for the economic steady state is straightforward.<sup>18</sup> For a given world price,  $p^w$ , the economic equilibrium outcome is determined uniquely by the last period, current, and next-period tariffs; thus, if the tariff is fixed (and this is understood by voters), an economic steady state is reached. Formally:

**Economic Steady State.** *The steady state economic equilibrium under a constant tariff level  $\tau$  is characterized by a constant skill composition across generations and a constant level of production in each sector given by:*

$$\theta(\tau) = 2 - \frac{\beta + c}{\beta p^w} \tau, \quad (2.7)$$

$$q^u(\theta) = 2 - (1 + c)\theta, \quad (2.8)$$

$$q^s(\theta) = 2\theta - \frac{\theta^2}{2}. \quad (2.9)$$

Finally, note that in our small open economy setting, national income is maximized under the free trade economic steady state; i.e. Eqs. (2.7)–(2.9) evaluated at  $\tau = 1$ .

## 2.2. The political process

We model the political process as a direct democracy over trade policy. At the beginning of each period, every agent in the population votes on the current period's trade policy, which subsequently

determines the wages and prices for that period.<sup>19</sup> The vote each period thus takes place before (young) agents decide on skill acquisition and before production and consumption occurs. The diagram below illustrates the within-period sequencing (Fig. 1).

To keep the model tractable, we adopt a binary referendum framework.<sup>20</sup> Agents can vote either to maintain the status quo tariff policy,  $\tau^o$ , or to switch to some alternate regime,  $\tau'$ . The two possible tariff regimes, denoted  $\tau_L$  and  $\tau_P$ , are for now taken as given, assumed to be fixed by a third party agenda setter whose objectives are the focus of Section 3. Without loss of generality, let  $\tau_L < \tau_P$  and think of the former as the liberal and the latter as the protectionist tariff. We define the *reform step* as  $\Delta \equiv \tau^o - \tau'$ , so that  $\Delta > 0$  represents a trade liberalization from  $\tau_P$  to  $\tau_L$ , while  $\Delta < 0$  would imply a protectionist shift from  $\tau_L$  to  $\tau_P$ . We assume that there is no bureaucratic or time cost of changing tariff regimes.

Trade policy is determined by majority vote. In the case of a tie, we assume that the status quo is maintained. If half or more of the population (i.e. voting mass  $\geq 1$ ; recall that both generations together have mass 2) votes in favor of the status quo tariff policy, the tariff regime remains unchanged and the existing tariff regime is deemed *politically stable*. If instead the majority votes for reform, the tariff switches to the proposed alternative regime immediately. In order to determine the policy preference of the majority, it is sufficient to consider the preferred tariff of the median voter, hereafter denoted by superscript  $M$ . Note that under a binary policy setup, the median voter will in general not be pivotal. Rather, we focus on the median because her tariff preference provides a simple shorthand indicator for the majority's preferred trade policy. Finally, we restrict attention to sincere (and implicitly compulsory) voting to rule out nuisance equilibria.

To simplify exposition, our formal definition of a political equilibrium incorporates two observations: first, we note that the equilibrium policy rule – the mapping from the state of the world to the implemented tariff – is synonymous with majority's (and hence the median voter's) most preferred tariff policy. Second, we recall that the skill composition of each cohort,  $\theta_t$ , summarizes the optimal skill acquisition decision of every agent  $a \in [0, 1]$  born at time  $t$ . Accordingly, we will define equilibrium in terms of the skill composition mapping, which is simply the summation of every agent's optimal skill acquisition strategy.<sup>21</sup>

### Definition 2.1. Political equilibrium

A subgame perfect political equilibrium is defined by the tariff policy rule  $T_t: H \rightarrow \{\tau_L, \tau_P\}$  and the skill composition mapping  $\Theta_t: H \rightarrow [0, 1]$ , such that  $\forall t$ :

1.  $T_t(h_t) = \text{argmax}_{\tau_t \in \{\tau_P, \tau_L\}} V(\tau_t, \tau_{t+1}; a_t^M)$   
 s.t.  $\tau_{t+1} = T_{t+1}(h_{t+1})$  and
2.  $\Theta_t(h_t) = 2 - \frac{\beta + c \left( \frac{\tau_t}{\tau_{t+1}} \right)^\alpha}{\beta p^w} \tau_{t+1}$ ,  
 s.t.  $\tau_t = T_t(h_t)$  and  $\tau_{t+1} = T_{t+1}(h_{t+1})$ ,

<sup>19</sup> Most contributions assume that only the old vote. One notable exception is Hassler et al. (2003b) who consider the possibility that both cohorts vote. In their case, the young side with the old poor in taxing the old rich, whereas in our model interests diverge even among the young themselves.

<sup>20</sup> The binary structure imposes little additional restriction relative to a continuous tariff framework: as we demonstrate shortly, tariff preferences are not interior. Thus, every voter (save a zero mass indifferent voter) strictly prefers either free trade or prohibitive tariffs (each individual is either a net lifetime buyer or net lifetime seller of the import-competing good). The binary assumption does, however, rule out an unstable equilibrium in which the indifferent voter is the median voter each period. (see Appendix A3.)

<sup>21</sup> That is, let  $\Theta = \int_0^1 s_a da$  where  $s_a$  takes a value of 1 if agent  $a$  chooses to acquire skills, and 0 if she chooses to remain unskilled.

<sup>18</sup> The derivation of the autarkic steady state and autarkic steady state price is offered in the appendix.

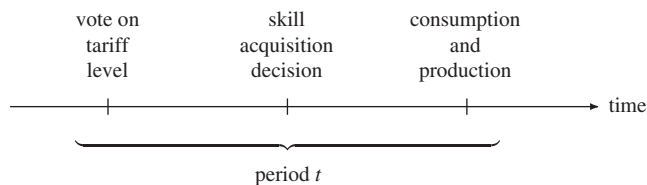


Fig. 1. Within-period sequencing.

where  $h_t$  is the history of skill composition–tariff pairs,  $\{\dots, (\tau_{t-2}, \theta_{t-2}), (\tau_{t-1}, \theta_{t-1})\}$  at time  $t$ ,  $H$  consists of the union of all possible sets of histories for all  $t$ , and  $V(\cdot)$  denotes lifetime indirect utility. Furthermore,  $a_t^M = \theta_{t-1}$  as will be shown below.

The first condition requires that the policy rule maximizes the lifetime indirect utility of the median voter (and thus the voting majority) under the rational expectation that the next period's tariff depends on the current period's tariff policy, both through the implied skill composition of the currently young cohort and possibly directly (for non-Markovian equilibria).

The second condition requires that individuals' skill acquisition strategies are consistent with the current realized tariff,  $\tau_t = T_t(h_t)$ , and also satisfy the rational expectation that  $\tau_{t+1} = T_{t+1}(h_{t+1})$ . Note that the above definition already incorporates the functional form of  $\theta_t$  that is given by Eq. (2.6).

Notice that we do not restrict equilibrium strategies beyond the requirement of subgame perfection. Normally this would present a problem, as dynamic systems typically exhibit an astounding multiplicity of equilibria. Here, however, our modeling framework already narrows the possibilities to just a handful of cases, all of which we find economically interesting.<sup>22</sup> Our more general equilibrium concept marks a key difference with the existing dynamic political economy literature, including Hassler et al. (2003a), which restricts attention to Markov perfect equilibria. We will return to this point below when we define the set of equilibria, only a subset of which is Markov perfect.

A *political steady state* is an economic steady state in which the status quo policy is maintained endogenously under the existing political process. Thus, a political steady state is given by Eqs. (2.6)–(2.9) under either initial tariff regime,  $\tau^0 \in \{\tau_L, \tau_P\}$ , in which the electorate maintains the previous period's tariff policy over the proposed alternative. Formally:

**Definition 2.2.** Political steady state

A political steady state is reached when  $\tau_t \equiv T_t(h_t) = \tau_{t-1} \forall t$ . A political steady state is summarized by the constant skill composition of the population under the steady state tariff,  $\bar{\tau}$ :

$$\theta(\bar{\tau}) = 2 - \frac{\beta + c}{\beta p^w} \bar{\tau}. \tag{2.10}$$

We begin our analysis of the equilibrium solutions by evaluating the trade policy preferences of each generation, which enables us to arrange both young and old voters over the population interval  $[0, 2]$

in weakly ascending order of each individual's preference for trade openness; the most protectionist voters are indexed closest to zero, the most liberal closest to 2. We then exploit the structure of the model to characterize the identities of two key voters in each time period: the median, whose vote is indicative of the majority's preference, and the indifferent voter, who separates the population between those who prefer the more protectionist regime and those who prefer the more liberal tariff policy. Comparing the median's position relative to the indifferent voter provides a straightforward way to determine the outcome of the tariff vote in each period.

**Older Voters.** It is immediate that members of the older generation must be polarized in the trade policy debate. Because older workers are intersectorally immobile, the older unskilled (import-competing) workers have an unambiguous preference for the highest possible tariff (autarky), while all of the older skilled workers prefer the smallest tariff possible. (For semantic convenience we will refer to this as free trade, keeping in mind that it could be a trade subsidy in the absence of a non-negativity constraint on the tariff.) To confirm that the most preferred trade policy by any older worker is necessarily a corner solution, simply note that the indirect utility of older unskilled (skilled) workers is strictly decreasing (increasing) in the local relative price according to:

$$V^{u,o} = v(p, 1) = Kp^{-\alpha} 1, \tag{2.11}$$

$$V^{s,o} = v(p, (1 + a)p) = Kp^{1-\alpha} (1 + a). \tag{2.12}$$

Thus:

**Lemma 2.2.** Among the older generation, political support for the liberal tariff regime is non-decreasing in ability level: the unskilled (lower ability) older agents strictly prefer the protectionist regime, while the skilled (higher ability) older agents strictly prefer the more liberal tariff policy.

Starting from an economic equilibrium at time  $t$  in which the skill composition of older workers is given by  $\theta_{t-1}$ , fraction  $(1 - \theta_{t-1})$  of the older generation is unskilled and thus unambiguously favors autarky; these voters can then be lined up on the left-most end of the  $[0, 2]$  population interval. Likewise, proportion  $\theta_{t-1}$  of the older generation is unambiguously pro free trade and therefore can be stacked at the top end of the population interval. Accordingly, the younger generation spans the population interval from  $[1 - \theta_{t-1}, 2 - \theta_{t-1}]$ . It is then immediate that the median voter must be a member of the young generation; by definition, the median voter is the individual at the center of the population interval (namely agent  $j = 1$ ) and since  $\theta_{t-1} \leq 1$  by definition, the young generation necessarily spans the median of the overall population.

**Young Voters.** Assessing the trade policy preferences of the pivotal younger generation is more involved than for the older cohort because, unlike their older counterparts, the young can adjust their educational decisions in response to the current realization of tariff policy. It is still the case that every agent's most preferred tariff will be characterized by a corner solution so that the young generation, like the old, can be categorized as either protectionists or free traders.

The young agents of each natural ability level can be characterized as either lifetime net producers or net consumers of the basic good, depending on the current and anticipated tariff levels. Members of the former group will favor protectionism (the lower the relative price of the skill-based good, the better) while the lifetime net suppliers of skill-based goods may or may not prefer free trade, depending on the (discounted) returns to skill acquisition relative to the cost of education.

<sup>22</sup> The usual nuisance equilibria are ruled out by three key assumptions: the small open economy set-up, which means that for a given tariff, prices are independent of  $\theta$ ; the continuum framework (so that no agent can influence  $\theta$  (or by extension,  $\tau$ ) through her individual skill acquisition choice); and the assumption that voters are unskilled when young, which rules out cycling equilibria, as we discuss below.

A simple observation provides substantial leverage in evaluating both the structure of trade policy preferences among the young generation and the characteristics of political equilibria. Notice that for any given future tariff, every young voter would strictly prefer protectionism in the current period.<sup>23</sup> (Recall that all workers are assumed to provide unskilled labor in the first period of life regardless of whether or not they undergo training to become skilled workers in the future.) Thus, even a pro-reform young voter would strictly prefer “protection today and free trade tomorrow” to “free trade today and free trade tomorrow.” Thus, the *only* reason young voters would vote for liberalization in the current period is because they understand the consequences of the present tariff policy for the skill composition – and thus the voting outcome – in the subsequent period.<sup>24</sup>

This universal preference for high tariffs while young allows us to rule out the possibility of a protectionist shift from  $\tau_L$  to  $\tau_P$  anywhere on the equilibrium path. If young voters (including the median) rationally expected protection in the future, they would never vote for the liberal regime in the current period. This allows us to rule out the possibility both of a one-time permanent shift from a liberal regime to protectionism, and, moreover, of any temporary deviation from *either* status quo policy in equilibrium.<sup>25</sup> Starting from a protectionist status quo, no young voter would optimally choose temporary liberalization with a rational expectation of a protectionist regime in the next period. A similar argument rules out the possibility of temporary protection: if starting from a liberal regime, young voters at a given time  $t$  expected that they could obtain temporary protection, then by rational expectations their predecessors at time  $t-1$  would have anticipated this behavior and thus voted for protection as well, contradicting the initial assumption of a liberal status quo at time  $t$ .

To characterize how trade policy preferences depend on young voters' skill acquisition decisions, we categorize the young generation into three groups: those who would upgrade their skills under either policy regime (the *high ability* agents), those who would educate themselves only under the more liberal policy regime (the *middle ability* agents), and those who would remain unskilled under either regime (the *low ability* agents). Using  $\hat{a}_P \equiv \hat{a}(\tau_P, \tau_P)$  ( $\hat{a}_L \equiv \hat{a}(\tau_L, \tau_L)$ ) to denote the ability of the threshold agent under a current and future protectionist (liberal) regime according to Eq. (2.3), and recalling that  $\hat{a}$  is increasing in  $\tau$  (the greater the level of import protection, the higher the ability of the threshold agent and the lower the skill composition of the population) so that  $\hat{a}_P \geq \hat{a}_L$ ,<sup>26</sup> the three types of agents are sorted on the generational unit interval as summarized below. Fig. 2 illustrates.

**Lemma 2.3.** For any pair of tariff alternatives,  $\{\tau_L, \tau_P\}$ , there are three types of young agents:

- i. **low ability** agents with ability  $a \leq \hat{a}_L$ , who would remain unskilled under either constant (current and future) tariff regime,  $\tau_L$  or  $\tau_P$ ;
- ii. **middle ability** agents with ability  $a \in (\hat{a}_L, \hat{a}_P)$ , who would acquire skills under the liberal regime but not under the protectionist regime; and
- iii. **high ability** agents with  $a > \hat{a}_P$ , who would acquire skills under either (current and future) tariff regime,  $\tau_L$  or  $\tau_P$ .

<sup>23</sup> Under the extreme parametric assumption that  $c = 1$  such that agents cannot earn wages as unskilled workers when undergoing skill-acquisition process, young future-skilled workers would be indifferent over first-period trade policy (holding second period trade policy fixed, and assuming agents hold no initial wealth).

<sup>24</sup> A secondary implication is that, as is typical in repeated game settings, an equilibrium with permanent protectionism will always exist: if voters believe that the next voters' strategy is independent of the current vote, they will always vote for protectionism (regardless of their predecessor's vote). See Section 2.3.

<sup>25</sup> That is, we can rule out the possibility of political equilibria that include tariff sequences  $\tau_{t-1} \rightarrow \tau_t = \tau_L \rightarrow \tau_P$ . The temporary deviation time paths:  $\tau_{t-1} \rightarrow \tau_t \rightarrow \tau_{t+1} = \tau_L \rightarrow \tau_P \rightarrow \tau_L$  or  $\tau_P \rightarrow \tau_L \rightarrow \tau_P$ , are thereby ruled out.

<sup>26</sup> The inequality is weak only in the corner scenario in which all agents would choose to acquire skills under both tariff regimes; i.e.  $\hat{a}_P = \hat{a}_L = 0$ .

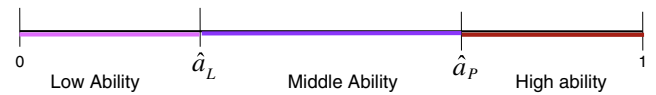


Fig. 2. Young generation ability types.

Since the lowest ability workers will remain unskilled under either tariff policy, they will unambiguously favor protectionism. Thus, we can stack fraction  $\hat{a}_L$  of the young generation alongside their older counterparts on the left hand side of the population interval. The middle ability agents, those with ability levels  $a \in (\hat{a}_L, \hat{a}_P]$ , will educate only under the expectation of the more liberal tariff regime. The proportion of the middle ability group that supports the more liberal tariff regime (if any) depends on the tradeoff between first period unskilled wages and education cost and second period income. A middle ability agent will vote in favor of the more liberal regime if:

$$v(p_P, 1) + \beta v(p_P, 1) \leq v(p_L, 1-c) + \beta v(p_L, (1+a)p_L) \Leftrightarrow a \geq \frac{\tau_P^\alpha \tau_L^{-\alpha} (1+\beta) - (1-c)}{\beta p^w} \tau_L - 1. \quad (2.13)$$

This expression demonstrates that the higher ability agents within the medium group would be the first to support freer trade; the higher an agent's ability, the higher her skilled wage and hence the greater her expected gains from liberalization.

Like the rest of the population, the high ability agents' most preferred trade policies are again characterized by a corner solution. A high ability agent  $a \in (\hat{a}_P, 1]$  will support the liberal regime if:

$$v(p_P, 1-c) + \beta v(p_P, (1+a)p_P) \leq v(p_L, 1-c) + \beta v(p_L, (1+a)p_L) \Leftrightarrow a \geq \frac{(\tau_P^\alpha - \tau_L^\alpha)}{(\tau_L^{\alpha-1} - \tau_P^{\alpha-1})} \frac{1-c}{\beta p^w} - 1. \quad (2.14)$$

Thus, we again find that the highest ability agents also among this group will be the first to support liberalization. Moreover, we can conclude that if any middle ability agents favor free trade, then all high ability agents favor free trade, and that if any high ability agent favors protection, then all middle ability agents favor protection. (Or in other words, there can be at most one indifferent voter in the young cohort.)<sup>27</sup> Perhaps surprisingly, even the highest ability agents of the young generation will not necessarily favor free trade. This ambiguity in trade policy preferences is driven by friction between unskilled earnings in the first stage of life and the discounted skilled earnings in the second period of life. We summarize our findings as follows:

**Lemma 2.4.** Among the young generation, the political support for the liberal tariff regime is non-decreasing in ability level:

- i. *Low ability* agents with  $a \in [0, \hat{a}_L)$  strictly prefer the protectionist regime;
- ii. *of the middle ability* agents with  $a \in [\hat{a}_L, \hat{a}_P)$ , those with individual ability less (greater) than  $\tilde{a}_m \equiv \frac{\tau_P^\alpha \tau_L^{-\alpha} (1+\beta) - (1-c)}{\beta p^w} \tau_L - 1$  prefer the high (low) tariff,
- iii. *of the high ability* agents with  $a \in [\hat{a}_P, 1]$ , those with individual ability less (greater) than  $\tilde{a}_h \equiv \frac{(\tau_P^\alpha - \tau_L^\alpha)}{(\tau_L^{\alpha-1} - \tau_P^{\alpha-1})} \frac{1-c}{\beta p^w} - 1$  prefer the high (low) tariff.

<sup>27</sup> To see this, note that the two expressions in Eqs. (2.13) and (2.14) coincide at the border between the middle and high ability groups: by definition, when  $a = \hat{a}_P$ , the left hand sides of the initial inequalities are equal (because under the protectionist regime agent  $a = \hat{a}_P$  is indifferent between acquiring skills and not), and the right hand sides are the same. Thus, if  $a = \hat{a}_P$ , either both Eqs. (2.13) and (2.14) hold or both of them fail. If they both hold, then the indifferent voter must be of the middle ability type, while all high ability types will strictly prefer the liberal regime. If they both fail (again, for individual  $a = \hat{a}_P$ ), then the indifferent voter must be a high ability type and all middle ability agents will strictly prefer protectionism.

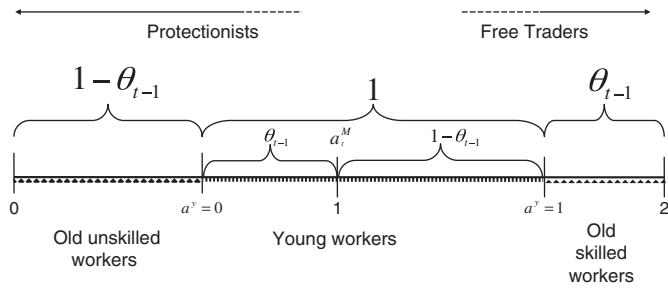


Fig. 3. The population interval by trade policy preference.

The preceding lemma implies that the young voters can be indexed over the population interval in increasing ability type. For any initial skill composition of the older generation,  $\theta_{t-1}$ , then, the young generation can be arranged ascending in ability type over the interval  $[1 - \theta_{t-1}, 2 - \theta_{t-1}]$  of the population support  $[0, 2]$ ; i.e. sandwiched between the old unskilled and skilled. Based on this ordering, we identify and compare first the indifferent agent who separates the protectionists from the free-traders, and second the median voter whose tariff preference matches the preferences of the majority. The position of the median to the left or to the right of the indifferent voter directly indicates which tariff the majority prefers.

**The Indifferent Voter.** We define the indifferent voter to be the (zero mass) individual who separates the population between the protectionists and the free traders. Building on Lemma 2.4, we have that:

**Lemma 2.5.** *The indifferent agent,  $\tilde{a}(\tau_t, \tau_p)$ , is a young voter of middle or high ability. If  $\tilde{a}_m \in [\hat{a}_L, \hat{a}_P)$ , she is a middle ability agent and if  $\tilde{a}_h \in [\hat{a}_P, 1]$ , she is high ability.*

Notice that because the indifferent voter is young, her identity is independent of the status quo ( $t-1$ ) tariff policy.

**The Median Voter.** Because fraction  $1 - \theta_{t-1} \leq 1$  of the older generation is protectionist and the young voters are mapped to the population interval according to ability type, the identity of the median voter is immediate:

**Lemma 2.6.** *The median voter at time  $t$  is the member of the young generation with ability level  $a_t^M \equiv a^M(\tau_{t-1}, \tau_t) = \theta_{t-1}$ .*

Note that the identity of the median voter depends on both the status quo and the realized (and ex-ante expected) contemporary tariff regimes through the skill composition of the older generation. In particular, the ability level of the median voter is decreasing with the measure of older unskilled workers ( $1 - \theta_{t-1}$ ). The greater (smaller) the vested interest in a high tariff among the older generation, the smaller (higher) the number of young agents needed to block liberalization, and hence the lower (higher) the ability level of the median. Fig. 3 summarizes.

2.3. Political equilibria

To determine the set of potential equilibrium solutions, first recall that the rational expectations assumption rules out the possibility of a protectionist shift in equilibrium, pursuant to the discussion of the young voter in the previous subsection. There are then just three candidate equilibrium time paths for tariffs: a steady state under  $\tau_L$ , a steady state under  $\tau_P$ , and a one time transition from  $\tau_P$  to  $\tau_L$ .<sup>28</sup> This reduced set of possibilities simplifies the analysis considerably. For any

<sup>28</sup> Note that the last type stands for an entire family of equilibria, depending on when the one-time shift occurs.

pair of possible tariff regimes,  $\tau_L$  and  $\tau_P$ , the equilibrium skill composition of the older generation can take three possible values in a rational expectations equilibrium:  $\theta(\tau_P, \tau_P)$ ,  $\theta(\tau_L, \tau_L)$ , or  $\theta(\tau_P, \tau_L)$ , depending on the status quo and current tariff policy.<sup>29</sup> Following Lemma 2.6, there are then three possible median voters identified on the population interval: the young agents with ability  $a^M(\tau_P, \tau_P)$ ,  $a^M(\tau_P, \tau_L)$ , and  $a^M(\tau_L, \tau_L)$ . From Eq. (2.6), we verify that  $a^M(\tau_P, \tau_P) < a^M(\tau_P, \tau_L) < a^M(\tau_L, \tau_L)$ ; intuitively, the ability level of the median voter will be lowest when the older generation makes its skill acquisition decisions under the expectation of lifetime protectionist trade policy, and highest when older workers anticipate a lifetime of freer trade.

We evaluate the existence of political equilibria by comparing the relative position of the median and indifferent voters on the population interval. If the indifferent voter lies to the left of the median voter, then the median voter and hence the majority favors the liberal regime; if instead the indifferent voter lies to the right of the median voter, then only the protectionist regime can succeed in the referendum. The potential for multiple equilibria is obvious once we recognize that the identity of the median voter depends on both the status quo and realized tariff regimes according to Lemma 2.6, while the identity of the indifferent voter is independent of the status quo. Formally, we have the following:

**Proposition 2.2.** *For any set of parameter values and tariff alternatives, the ability level of the indifferent voter,  $\tilde{a}$ , relative to the ability level of each potential median voter  $a^M \in \{a^M(\tau_P, \tau_P), a^M(\tau_P, \tau_L), a^M(\tau_L, \tau_L)\}$  determines the set of political equilibria as follows:*

- i. *The protectionist steady state is a political equilibrium for all  $\tilde{a} \in [0, 1]$ .*
- ii. *For  $\tilde{a} \leq a^M(\tau_L, \tau_L)$ , the liberal political steady state is a political equilibrium.*
- iii. *For  $\tilde{a} < a^M(\tau_P, \tau_L)$ , there exists a family of transition equilibria in which the policy path follows  $\tau_t = \tau_P$  as long as  $t < T$  and  $\tau_t = \tau_L$  for  $t \geq T$ .*

The first part of Proposition 2.2 recognizes that the protectionist steady state is always an equilibrium. For  $\tilde{a} > a^M(\tau_P, \tau_P)$  this is obvious: the median voter under protection ( $a^M(\tau_P, \tau_P)$ ) is herself protectionist, indicating that the majority would vote to maintain the status quo under  $\tau_P$ . However, the protectionist steady-state is an equilibrium possibility even when  $\tilde{a} < a^M(\tau_P, \tau_P)$ , due to the fact that in our model the young are unskilled. Even if the majority of voters would prefer the liberal regime today and tomorrow over protection today and tomorrow, they may nonetheless optimally vote for protection today if they are convinced that their successors will choose protection. And if each subsequent generation shares this expectation, then their expectations become self-fulfilling. This said, we consider the potential for such fatalistic beliefs to lead to an ‘unraveling’ to the protectionist steady state to be of only marginal interest when the majority of voters under protection would prefer the liberal steady state, i.e. when  $\tilde{a} < a^M(\tau_P, \tau_P)$ .

The remaining set of equilibrium possibilities is determined by the relative position of the median and indifferent voters on the young population interval.<sup>30</sup> First, if the indifferent voter is situated to the right

<sup>29</sup> If instead the economy started from some arbitrary initial condition,  $\theta_0$ , then the equilibrium sequence of  $\{(\tau_1, \theta_1), (\tau_2, \theta_2) \dots\}$  pairs would jump immediately to one of the equilibrium time paths described below. The initial skill composition of the old would determine the identity of the first period’s median voter (and could thus serve as an equilibrium selection device), but otherwise would have no direct effect on the economy. Given the structure of the model, there are no transition dynamics with which to contend.

<sup>30</sup> We have confirmed the existence of each scenario under reasonable parameter values. For instance, all three equilibrium possibilities may be generated by varying just the cost of skill acquisition. Setting  $\alpha = .5$ ,  $\beta = 1$ ,  $p^w = 1.5$ ,  $\tau_L = 1.2$ , and  $\tau_P = 1.75$ , yields the conditions for each of the cases in Proposition 2.2 for values  $c = .75, .65$ , and  $.5$ . More generally, parameter values that increase the distance between the three possible median voters – higher  $c$ , lower  $p^w$ , lower  $\beta$ , and the greater the difference between  $\tau_L$  and  $\tau_P$  – will increase the potential for multiple equilibria.

of all three potential median voter ability levels ( $a^M(\tau_p, \tau_p) < a^M(\tau_p, \tau_L) < a^M(\tau_L, \tau_L) < \tilde{a}$ ) so that under any pair of status quo and realized tariffs, the majority of voters would favor the protectionist regime, then the protectionist steady state is the unique political equilibrium.

If instead  $\tilde{a} \leq a^M(\tau_L, \tau_L)$  as in part (ii) of the above proposition, then the liberal steady state constitutes a second political equilibrium: under the liberal steady state, the voting majority would prefer the liberal status quo to protection.<sup>31</sup> A third and final form of political equilibrium arises if  $\tilde{a} < a^M(\tau_p, \tau_L)$ . Starting from a protectionist status quo, voters can rationally expect reform to occur in the next period, since the then-implied median voter in the subsequent period,  $a^M(\tau_p, \tau_L)$ , (and thus the voting majority) would indeed favor the liberal regime over remaining in the protectionist steady state.

Since this one-time ‘organic’ transition can occur at any point in the time path of the economy, there is a family of these equilibria, differentiated only by the date of transition,  $T$ .

The most interesting case is the intermediate range in which the indifferent voter lies between the median voter that would obtain under either steady state tariff policy,  $\tilde{a} \in [a^M(\tau_p, \tau_p), a^M(\tau_L, \tau_L)]$ : starting from a protectionist status quo the majority would prefer to maintain protection, while starting from the liberal status quo policy, the majority would prefer to maintain the lower tariff. Within this interval there are two possibilities: if  $\tilde{a} < a^M(\tau_p, \tau_L)$ , the transition equilibrium exists, and if  $\tilde{a} \geq a^M(\tau_p, \tau_L)$ , it does not. Fig. 4 summarizes.

Finally, we note that while the two steady states are Markov perfect equilibria, the transition equilibrium is not. In a Markov perfect equilibrium, the tariff policy rule and skill composition must be time invariant mappings from payoff relevant state variables. Here, the only endogenous payoff relevant state variable (at time  $t$ ) is the current skill composition of the older generation,  $\theta_{t-1}$ . Thus, Markov perfection restricts attention to equilibria in which  $T_t(h_t) = T(\theta_{t-1})$  and  $\theta_t(h_t) = \theta(\theta_{t-1})$ , which necessarily rules out the organic reform possibility embodied in the transition equilibrium.<sup>32</sup> At the same time, however, we find the potential for transition of primary interest from a policy perspective, which we explore further in the next section.

Henceforth, we consider the case in which  $\tilde{a} \in (a^M(\tau_p, \tau_p), a^M(\tau_L, \tau_L))$ , so that multiple equilibria exist for reasonable values of  $\tau_p$  and  $\tau_L$  (bound below by free trade and above by the prohibitive tariff). The question then arises, if the economy is in a “bad” equilibrium from a national welfare maximization standpoint – a protectionist rut characterized by the political steady state under  $\tau_p$  – whether and how it can transition to the more liberal steady state under  $\tau_L$ .<sup>33</sup> The answer is the focus of the next section, which explores the possibility of different mechanisms for transitioning between steady states.

### 3. Transition mechanisms

Given our small open economy framework, it is immediate that each generational cohort would enjoy an unambiguously higher level of utilitarian social welfare under the liberal steady state than under

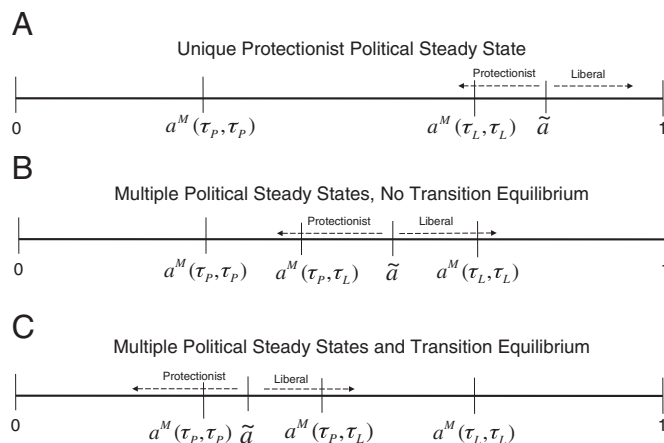


Fig. 4. Equilibrium possibilities.

the protectionist steady state. (This is not to say, of course, that there are necessarily *Pareto* gains from freer trade; without transfers, there most certainly are not.) This familiar fact leads us to analyze potential mechanisms that induce transition from the protectionist steady state to a more liberal regime.

It is understood that the cause of transition out of steady state must lie outside of the political process modeled so far, since the median voter under the protectionist steady state has, by definition, no interest in such a change. We argue that the presence of an outside agenda setter is common in many democracies, particularly when it comes to broad, liberalizing reforms. Elder statesmen or so-called political pundits could play this role, as might foreign governments pushing for multilateral trade talks or applying political pressure.

Since the high tariff regime is perpetuated by agents' self-fulfilling beliefs that the same regime will remain in place next period, one possibility to break away from this vicious circle is to alter agents' expectations over future trade policy. If young workers anticipate freer trade in the future, they will upgrade their skills, which in turn would change the skill composition of the older generation in the subsequent period, and thus the future constituency in favor of liberalization. If the potential future constituency supporting free trade is sufficiently large, an “organic” political shift from a protectionist steady state to a liberal steady state can arise in political equilibrium, as in case (iii) of Proposition 2.2. One way to change people's expectations is by announcing that there will be a policy shift in the next period. Clearly, the credibility of the announcement will be crucial, even when organic political reform is possible. An announcement may need to rely on a commitment device, such as a bilateral treaty or impending accession to, for example, the WTO or the EU, unless the actor making the announcement possesses some inherent credibility.<sup>34</sup> Provided the announcement is credible, the expectation of freer trade turns out to be self-fulfilling and hence rational.

Importantly, notice that the impetus for regime shift need only be temporary. No further announcements in subsequent periods are required. Once the new policy and the expectation that it will continue has set in, it is entirely self-sustaining. This insight applies to all the mechanisms for effectuating reform that we consider in this section. In what follows, we analyze first different forms of trade adjustment assistance, then evaluate the influence of the terms-of-trade on the country's voting outcome, and finally examine the role played by the magnitude of the proposed tariff reform.

<sup>31</sup> Note that a necessary (but not sufficient) condition for existence of the liberal steady state is  $\theta(\tau_L, \tau_L) > \frac{1}{2}$ ; that is, more than half of each generation would acquire skills under the liberal steady state. For developed countries, we find this requirement quite plausible. We do caution the reader, though, that in practice it might be difficult to draw the line between binary skilled versus unskilled designations. A broader interpretation of the threshold requirement is that the majority of workers (under a liberal steady state) will eventually hold sufficient skill sets to be employable in export-oriented (skill-intensive) sectors.

<sup>32</sup> In a Markov perfect equilibrium, transition could be induced through some exogenous payoff-relevant change (even something as trivial as taxing half of the population, selected at random, by one penny, and redistributing those pennies to the remaining voters). This fragility of Markov perfection is among the reasons we prefer to avoid it here.

<sup>33</sup> Recall that in this small open economy setting, the national income maximizing tariff is zero.

<sup>34</sup> See Staiger and Tabellini (1987), Bagwell and Staiger (1999, 2002) for more about the potential role of trade agreements and international institutions in achieving trade liberalization through improved government credibility or other means.



3.1. Transfers and subsidies

Policy supplements to trade reform in developed countries are commonly known as trade adjustment assistance programs, TAA for short. These policy packages typically involve a set of simultaneous measures aimed to placate those voters negatively affected by trade reform, while facilitating structural change by enabling workers to switch sectors. Policies typically include elements of both worker training programs and direct transfers to compensate the economic losers from trade liberalization, paid for (net) by the beneficiaries of the reform. In this section we analyze two such measures: education subsidies and direct transfers from economic winners to economic losers.<sup>35</sup> We find that these two measures have potentially opposite effects on the ultimate political viability of reform, and are thereby illustrative of the range of possible outcomes of TAA measures, positive as well as negative.

3.1.1. Education subsidies

We consider a simple policy in which education is subsidized by reducing the cost of acquiring skills, financed by a poll tax. Formally, let  $s \in [0, c]$  denote the (gross) subsidy paid to every young agent who decides to acquire skills, reducing the cost of doing so from  $c$  to  $c-s$ . Requiring a balanced budget on part of the government implies that the poll tax is:  $\delta = \frac{s}{2}\theta_t$ .

Taking this into account, Eq. (2.2) governing the skill acquisition decision is modified as follows:<sup>36</sup>

$$v(p_t, 1 - (c-s) - \delta) + \beta v(p_{t+1}, (1+a)p_{t+1} - \delta) \geq v(p_t, 1 - \delta) + \beta v(p_{t+1}, 1 - \delta), \tag{3.1}$$

which results in the following modified critical ability level:

$$\hat{a}_t(\tau_t, \tau_{t+1}) \equiv \frac{\beta + (c-s)\left(\frac{\tau_t}{\tau_{t+1}}\right)^\alpha}{\beta p^w} \tau_{t+1} - 1. \tag{3.2}$$

Note that the education subsidy decreases the critical ability level and thus increases the skill composition of each generation, while the poll tax itself does not directly influence the education decision, since it must be paid irrespective of whether one acquires skills.

In line with the analysis in the baseline case, we can derive the (modified) identity of the median and the indifferent voters:

$$a_t^M \equiv \theta_{t-1} = 2 - \frac{\beta + (c-s)\left(\frac{\tau_{t-1}}{\tau_t}\right)^\alpha}{\beta p^w} \tau_t, \tag{3.3}$$

$$\tilde{a}_h = \frac{\tau_L^\alpha(1-c+s-(1+\beta)\delta_L) - \tau_P^\alpha(1-c+s-(1+\beta)\delta_P)}{\beta(\tau_P^{\alpha-1} - \tau_L^{\alpha-1})p^w} - 1, \tag{3.4}$$

$$\tilde{a}_m = \frac{\tau_P^\alpha(1+\beta)(1-\delta_P) - \tau_L^\alpha(1-c+s-(1+\beta)\delta_L)}{\beta p^w \tau_L^{\alpha-1}} - 1, \tag{3.5}$$

where, as before, the indifferent voter can be a member of either the medium or high ability groups, and  $\delta_L$  ( $\delta_P$ ) is the poll tax under the liberal (protectionist) regime.<sup>37</sup>

<sup>35</sup> Retraining of older workers lies outside the scope of the model, since we abstract from sectoral frictions – or rather assume them to be infinite – by ruling out mobility in the second period of life.

<sup>36</sup> It is assumed that the agent expects the policy to be in place for the two periods – assuming it to be in place for one period merely alters the value of the tax.

<sup>37</sup> Note that  $\delta_L > \delta_P$  reflects the higher skill composition under the lower tariff.

Differentiating Eqs. (3.3)–(3.5) with respect to the subsidy,  $s$ , and taking into account the government's budget constraint yields:

$$\frac{d\tilde{a}_m}{ds} < \frac{d\tilde{a}_h}{ds} < 0 < \frac{da^M}{ds}.$$

While the ability level of the median voter under each regime increases with the education subsidy, the reverse happens to the indifferent voter. These two effects work in tandem to increase the political viability of the liberal steady state. The education subsidy thereby may induce a transition from the protectionist to the more liberal regime with the ensuing welfare benefits overall. Fig. 5 illustrates. Note that once transition has occurred the education subsidy can be abolished provided that the new liberal steady state is politically stable without the subsidy.

3.1.2. Transfers

Another common policy supplement to trade reform in developed countries consists of direct compensation schemes designed to partially offset the losses faced by older workers who are adversely affected by trade liberalization.<sup>38</sup> We consider a scheme that pays a subsidy  $s$  per person to the unskilled old if, starting from a protectionist regime, trade liberalization is enacted.<sup>39</sup> As before, to finance the scheme the government levies a poll tax of  $\delta$  to be paid by the skilled.<sup>40</sup> Let transition from the protectionist to the liberal regime occur at time  $T$ .

The critical ability level for generation  $T-1$  (who will be old when transition occurs) is then:

$$\hat{a}(\tau_{T-1}, \tau_T) \equiv \frac{\beta(1+s+\delta) + c\left(\frac{\tau_{T-1}}{\tau_T}\right)^\alpha}{\beta p^w} \tau_T - 1, \tag{3.6}$$

where the subsidy  $s$  and the tax  $\delta$  at time  $T$  satisfy  $s(1-\theta_{T-1}) = \delta\theta_{T-1}$  due to the government budget constraint.

Substituting the government budget constraint into Eq. (3.6) and totally differentiating we find that the critical ability level increases with the transfer:

$$\frac{d\hat{a}(\tau_P, \tau_L)}{d\delta} = \frac{1}{\hat{a}(\tau_P, \tau_L)} \left( \frac{p^w}{\tau_L} + \frac{\delta}{\hat{a}(\tau_P, \tau_L)^2} \right)^{-1} > 0; \tag{3.7}$$

Provided the transfer scheme does not completely offset unskilled old workers' losses (which certainly seems the case in practice), and that taxes are not so large as to make skilled older workers into protectionists,<sup>41</sup> we then have that the median voter who would obtain at the time of transition,  $T$ , is of a lower ability type – so that the majority is more likely protectionist – under the transfer scheme than

<sup>38</sup> It is important to be cautious with semantics when discussing transfers in the TAA context. Consistent with conventional economic terminology, this section refers to transfers as lump sum redistribution payments from skilled to unskilled workers. Policy makers, however, more frequently use the phrase “transfer programs” to describe alternate forms of payments that might be better described as education subsidies. Specifically, programs that offer wage subsidies to only “displaced workers” (i.e. agents who switch sectoral orientation following trade liberalization) are best characterized in our model as targeted education subsidies, since they effectively reduce the net cost of skill acquisition for agents with  $a \in [\hat{a}(\tau_P, \tau_L), \hat{a}(\tau_P, \tau_P)]$ .

<sup>39</sup> To give the scheme the best chance, we assume that transfers go only to those workers who are old at the time of transition, whereas the unskilled young cannot expect transfers (as they still have the option to acquire skills), and the program expires once the economy returns to steady state. Relaxing either of these assumptions serves only to strengthen our results.

<sup>40</sup> Note that the skilled with relatively low ability actually lose from trade liberalization. However, trade adjustment programs typically do not make this distinction, basing compensation on employment status rather than overall worker welfare.

<sup>41</sup> Formally, this amounts to assuming  $s < \left(\frac{\tau_P}{\tau_L}\right)^\alpha - 1$  and  $\delta < \left[1 - \left(\frac{\tau_P}{\tau_L}\right)^{\alpha-1}\right] \frac{p^w}{\tau_L} (1 + \hat{a}(\tau_P, \tau_L))$ .

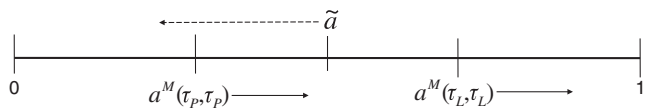


Fig. 5. The effect of education subsidies.

in the base line (no transfer) case.<sup>42</sup> The transfer scheme thus diminishes the political feasibility of trade liberalization. Indeed, transfer augmented trade liberalization might not be politically stable at all, even if such a transition would have been feasible without direct transfers.

The result does not necessarily imply that transfers are bad policy, however. First, if transfer payments are paid only to “displaced workers” – i.e. agents  $a \in [\hat{a}(\tau_p, \tau_L), \hat{a}(\tau_p, \tau_p)]$  who would have remained in the import-competing sector but for the anticipated liberalization – then such transfers are defacto education subsidies targeted to the marginal workers, and will therefore improve the political viability of liberalization in accordance with the previous section. Further, to the extent that transfers are *unanticipated*, they would not imply the same distortionary shift in skill acquisition behavior. Third, the absence of sectoral mobility among old workers assumed in our model leads to particularly stark results; in general, the greater the ability of experienced workers to adapt to changing economic conditions, the less distortionary transfer payments may be. Finally, compensatory transfers may weaken the intensity of unskilled workers’ opposition to reform (if not their ranks); in our simple majoritarian framework with costless voting, opponents’ fervor plays no role, though in practice it may operate via lobbying intensity or similar collective action. Alternatively, if voting is voluntary and costly, then diminishing the intensity of opposition to reform may shift participation rates and thus the electoral outcome; we are grateful to an anonymous referee for pointing out the contribution of Krishna and Morgan (2010) in this context. Despite these caveats, our analysis illustrates a potential danger germane to many TAA transfer schemes: sectorally targeted transfers can reduce workers’ ex ante incentives to shift out of import competing industries, and thus may erode the potential future political constituency located in export oriented, pro-reform sectors.

### 3.2. External terms of trade changes

The political support for trade reform depends on the skill composition of the population, which is determined in part by the terms of trade. The more favorable the terms of trade, the lower the critical ability level, and hence the higher the proportion of the population acquiring skills. A favorable shift in the terms of trade thus leads to a higher ability level of the median voter(s), moving the window of median voters to the right, while it has no first order effect on the identity of the indifferent agent among the young. As a result, an exogenous improvement in the terms of trade increases the political support for trade liberalization.

Among the many forces that can shift a country’s terms of trade, it is natural in our context to focus on the trade policy decisions taken by trading partners.<sup>43</sup> Suppose a large trading partner liberalizes trade by lowering the import tariff on the skill-intensive good that the country under consideration exports to its partner. This unilateral liberalization on part of the partner country will result in a favorable shift in the home country’s terms of trade. As outlined above, the change in the terms of trade shifts the window of median voters to the right. And as

the median voters are of higher ability and more pro-trade, the liberalized regime tends to become politically stable (if it was not) and the transition equilibrium becomes feasible.<sup>44</sup>

This positive correlation between unilateral trade policy decisions by large trading partners opens up the possibility of multiple equilibria in a non-cooperative international trade policy game. The reason is that trade liberalization on part of the other country makes domestic liberalization politically feasible, and vice versa.<sup>45</sup> Such a multiplicity of equilibria in the international context comes in addition to the inherent multiplicity of equilibria that our model exhibits even in a purely unilateral context. Indeed, the latter feature is among the key novelties of our model, as we demonstrate the potential for multiple equilibria even for small countries without any change in the terms of trade.

### 3.3. Radical reform

This final section explores a different sort of thought experiment, asking whether there are preconditions on the step-size of a liberalization proposal necessary for reform to be feasible. From the analysis in Section 2.2 it is clear that the existence of the liberal steady state depends not only on the status quo tariff, but also on the alternative regime, since the identity of the indifferent voter (and hence implicitly the trade preferences of the median voter) depends on the pair of tariff alternatives. The policy question is then: starting from the protectionist regime, which proposed tariff alternatives (if any) would enable a regime change?

Perhaps surprisingly, we find that the best way to block reform is to propose a relatively minor tariff liberalization. Starting from the protectionist steady state, a tariff liberalization referendum is sure to fail for a sufficiently small reform step, since (tautologically)  $\lim_{\tau' \rightarrow \tau_p} a^M(\tau_p, \tau') = a^M(\tau_p, \tau_p)$ . That is, the median voter who would obtain if voters rationally expected a shift from the protectionist regime to the alternative regime is vanishingly close to the status quo protectionist median voter, as the reform step converges to zero.

There thus exists a range of tariff reform proposals,  $\tau \in (\underline{\tau}, \tau^P)$  that are too modest to admit even the possibility of reform, since they are not themselves politically stable. Conversely, more radical tariff reform proposals – those that involve a tariff alternative  $\tau < \underline{\tau}$  – are politically stable and therefore permit the potential for reform through the policy channels identified in earlier subsections.

Our finding that radical reform may be necessary to generate the political support for tariff reform parallels the similar finding by Krishna and Mitra (2008) whose intuition also applies in this context: because voters’ political allegiances depend on their (net lifetime) sectoral orientation, and are monotonically increasing in the relative price of the good in which they have comparative advantage, a big shift in the proportion of the population employed in the export oriented (skill-based) sector is necessary to generate political support for reform. But while in their model, shifting workers’ sectoral orientation requires exogenous changes in terms of trade, this section demonstrates that (potential) political support for tariff reform can be generated by sufficiently radical liberalization proposals.

## 4. Conclusion

This paper evaluates the dynamic political economy aspects of tariff reform in the presence of populist politics. The model is designed in such a way to capture (i) a dynamic environment, specifically the

<sup>42</sup> Note that the indifferent voter remains unchanged under the transfer scheme since she is young and unskilled, and thus ineligible for transfer payments and exempt from taxes on skilled labor.

<sup>43</sup> Note that an export subsidy enacted by the country itself would have the same effect, and offers a potential interpretation of the East Asian tigers: a temporary period of substantial export subsidies can build a political constituency in support of permanent open trade.

<sup>44</sup> The potential for a large country to induce irreversible trade liberalization in a small trading partner is similar in spirit to McLaren (1997). Indeed, here as in McLaren’s paper, the large trading partner could easily revert to more protectionist policies without fear of retaliation once its small trading counterpart reaches the liberal steady state.

<sup>45</sup> This mechanism has been pioneered by Krishna and Mitra (2005) and Krishna and Mitra (2008).

potential influence of the status quo policy on the political constituencies for and against reform, (ii) the political frictions both within and across generations borne of different abilities to adjust to changing economic conditions, and (iii) the endogeneity of voters' policy preferences and choices with current and expected economic conditions. Populations can and do evolve in response to economic conditions; this paper constructs a simple model to evaluate how and why these changes can (and sometimes do not) occur.

We find that multiple political steady states may exist within an economy, and thus that voters potentially can get stuck in a "protectionist rut" even though aggregate welfare would be higher under a more liberal tariff regime. A series of thought experiments demonstrates that the multiplicity of political equilibria can be broken through a number of third party induced changes. We discuss several potential mechanisms for escaping the protectionist rut: announcements of future policy commitments that change young voters' expectations about the future; terms of trade improvements triggered by trading partners' unilateral tariff reforms; temporary education subsidies that reduce the cost of skill acquisition and thus increase the political constituency in favor of open markets; and structuring referenda to put forward substantial reform packages rather than minor policy changes. We also find, perhaps provocatively, that transfer payments to workers in the import-competing sectors following trade liberalization may reduce the potential for endogenous political reform, unless they are carefully constructed in such a way that they do not adversely influence young workers' skill acquisition decisions. Notably, policy mechanisms for transitioning to a liberal trade regime typically can be temporary; permanent trade reform may be brought about by even short-term policy triggereers.

Our model and results adopt the perspective of a developed country, assumed to have natural comparative advantage in the skill-based good. While the results from the developing country perspective are *mathematically* simply the inverse of the findings outlined in the previous sections, it is worth taking a moment to highlight the important differences in their policy implications. Specifically, the positive implication of the base-line model in Section 2, that countries can get stuck in a protectionist rut when too little of the population acquires skills, is reversed for the developing country case. For a country with comparative advantage in the unskilled based good, the model indicates that protectionist rut arises when, from an efficiency standpoint, too many workers acquire skills. Thus, to escape a protectionist regime, the model suggests the implementation of education taxes rather than subsidies. At face value, this result is starkly unappealing (and seemingly unrealistic). But our findings are easily recast: suppose that we reframe the two sectors of the economy, so that one is secondary school intensive (e.g. manufacturing), while the other is post-secondary intensive (e.g. pharmaceutical). In that case, the model suggests that greater investment in secondary school education would lead to reform in one country, while more investment in post-secondary institutions would induce reform in the other. Once sectoral choice and education are viewed in a richer context, application of our model's results to a developing country framework generates sensible interpretations.

There are a number of promising extensions to be pursued in subsequent research. First, from a theoretical perspective, it would be interesting to move away from the simple two good model to explore the skill acquisition decision in a richer framework with a multiplicity of sectoral opportunities.<sup>46</sup> Such a study would, among other things, formalize the qualitative suggestion put forth in the previous paragraph. A second interesting extension would be to take a closer look at the nexus between population growth (abstracted from in this paper) and the likelihood of economic reform. Our model suggests that a shrinking population, by giving more political clout to the old, can

stall reform, and a growing population can promote it. To establish such a result rigorously, a richer lifetime of agents in the OLG model would be required. Empirically, cross country panel studies could explore the potential influence of variations in educational access, cost, and education, differential voter turnout across generations, and welfare programs on the success of trade reform and public ratification of regional integration agreements. Finally, one could envision formal policy analysis of the optimal structure of the trade adjustment assistance (TAA) programs focused on both generational and individual worker differences that would offer transfer payments to "buy out" old unskilled workers, while offering only education subsidies to younger, less able, workers.

**Appendix A1. Autarkic equilibrium**

The autarkic equilibrium price,  $p^a$ , and skill composition of the older generation,  $\theta(p^a)$ , are given implicitly by the pair of equations:

$$p^a(\theta) = \frac{\alpha}{1-\alpha} \frac{2-\theta(1+c)}{2\theta-\frac{\theta^2}{2}}; \tag{A1.1}$$

$$\theta(p^a) = \min\left\{1, \max\left[0, 2-\frac{\beta+c}{\beta p^a}\right]\right\}. \tag{A1.2}$$

Where the first expression is derived from the market clearing condition,<sup>47</sup> and the second equation pins down the equilibrium skill composition according to Eq. (2.6) and under the boundary conditions that by definition  $0 \leq \theta \leq 1$ . Solving yields the parametric form of the (interior) autarkic price:

$$p^a = \frac{\alpha\beta c + \sqrt{((1-\alpha)c + \beta(1 + \alpha(1 + c)))^2 - 2\alpha\beta((1-\alpha)c + \beta(1 + \alpha(1 + 2c)))}}{2(1-\alpha)\beta}. \tag{A1.3}$$

Notice that the Cobb–Douglas preference structure (with  $\alpha \in (0, 1)$ ) ensures that the economy will be diversified in autarky. Thus, we know that  $\theta(p^a) > 0$  so that the lower boundary condition on  $\theta$  will not bind. It is possible, however, to reach a corner solution in which  $\theta(p^a) = 1$ ; even if every agent is skilled in the second period of life, the young generation will produce a positive quantity of the unskilled good as long as  $c < 1$ . The corner solution at  $\theta(p^a) = 1$  will obtain if  $\frac{\alpha}{1-\alpha} \geq \frac{3}{2} \frac{\beta+c}{\beta(1-c)}$ ; that is, every worker will upgrade her skills under autarky for sufficiently high values of  $\alpha$  (strong preference for the skill-based good) or  $\beta$  (a low discount rate). Conversely, the boundary condition is certain *not* to bind in the limit as  $c \rightarrow 1$ .

**Appendix A2. Tariff revenue**

This appendix investigates how the paper's results are affected by the collection and redistribution of tariff revenue. As is customary in the literature, we assume that in each period tariff revenue is distributed uniformly among the members of the population. Denoting the aggregate tariff revenue at time  $t$  by  $R_t$ , this implies that each agent alive at time  $t$  receives a allocation of  $r_t = R_t/2$ .

It is clear that uniform redistribution of tariff revenue will not affect individuals' skill acquisition decisions. To see this, note that Eq. (2.2) has to be augmented with the inclusion of tariff revenue as

$$^{47} \text{ i . e . } \quad q^s(p^a) = d^s(p^a) \Rightarrow q^s(\theta(p^a)) = \frac{\alpha}{p^a} [p^a q^s(\theta(p^a)) + q^u(\theta(p^a))] \Rightarrow p^a = \frac{\alpha}{1-\alpha} \frac{q^s(\theta(p^a))}{q^u(\theta(p^a))}.$$

<sup>46</sup> See Blanchard and Willmann (2008) for early work in this direction.

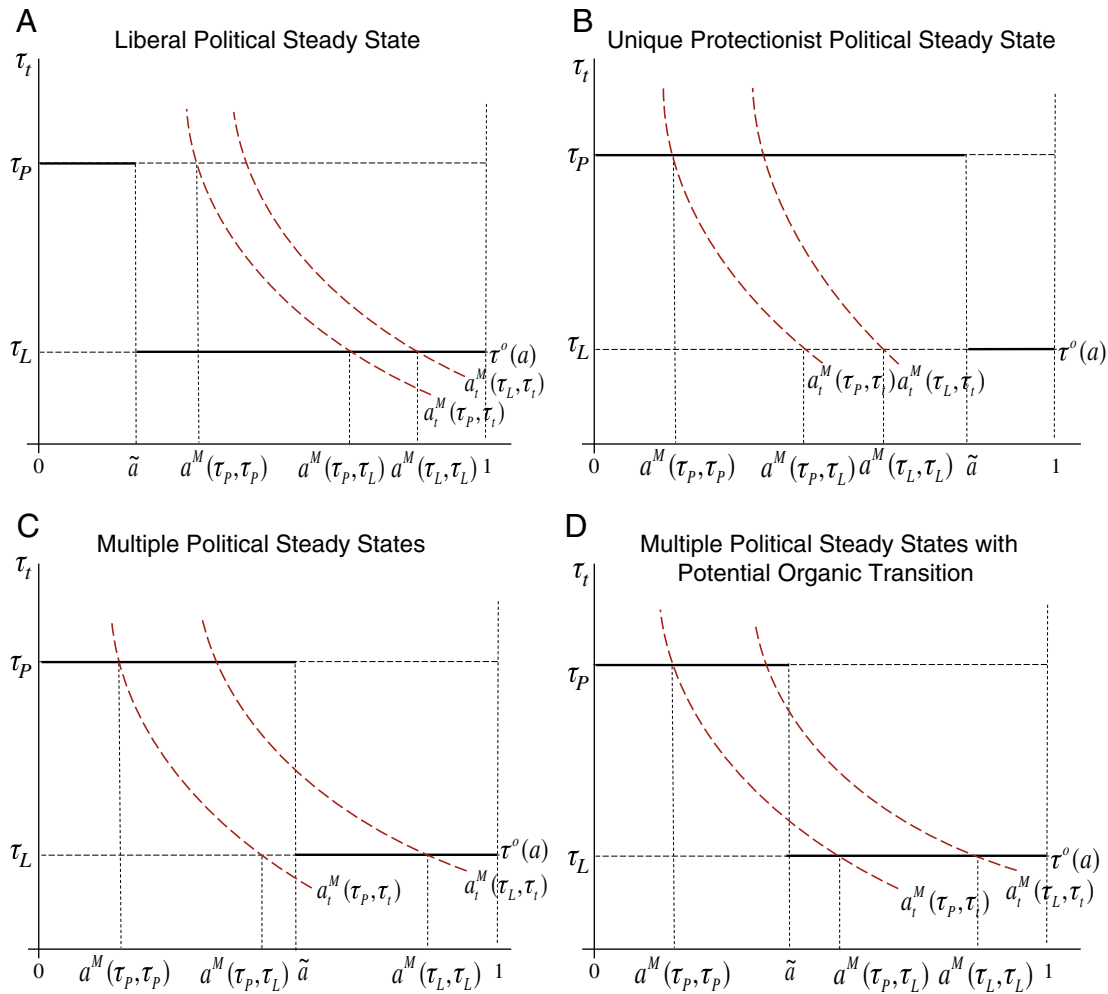


Fig. 6. Equilibrium existence.

follows:

$$v(p_t, 1 - c + r_t) + \beta v(p_{t+1}, (1 + a)p_{t+1} + r_{t+1}) \geq v(p_t, 1 + r_t) + \beta v(p_{t+1}, 1 + r_{t+1}). \quad (A2.1)$$

Evaluating the inequality, the tariff revenue payments cancel immediately, since the marginal utility of income is constant under Cobb–Douglas preferences. Thus, we have that every agents' skill acquisition decision – and hence the identity of the median voter – is independent of the (uniform) tariff revenue rebate,  $r_t$ .

The tariff revenue rebate clearly does carry important implications for individuals' preferences over trade policy, as the payment generally will vary with the tariff. We can solve the modified model to generate the following expression for the per capita tariff rebate as a function of the ad-valorem tariff and skill composition of the population:

$$r_t = \frac{1}{2}(\tau_t - 1) \frac{\alpha c \theta_t + \left(2(1 - \alpha) \frac{p^w}{\tau_t} + \alpha\right) \theta_{t-1} - \frac{1}{2}(1 - \alpha) \theta_{t-1}^2 \frac{p^w}{\tau_t} - 2\alpha}{1 - (1 - \alpha)(\tau_t - 1)} \quad (A2.2)$$

Tautologically, tariff revenue is zero under a free trade regime ( $\tau = 1$ ). Likewise, as the tariff approaches the prohibitive level, tariff revenue must again fall back to zero. But within the intermediate

range of positive, non-prohibitive tariffs, revenue is a positive and concave function of the tariff: starting from free trade, revenue at first increases with the tariff until the revenue maximizing tariff is reached, and then revenue falls with the tariff approaching the prohibitive level.

Returning to our main analysis, a choice between any two tariff regimes entails a change in tariff revenue that can be positive, negative, or possibly zero. This revenue effect will in general change the identity of the indifferent voter, although it does not affect the identities of the respective median voters as noted earlier.

Consider, for illustration, a case in which tariff revenue is lower for  $\tau_L$  than for  $\tau_P$ .<sup>48</sup> The loss in tariff revenue that accompanies liberalization (or the forgone increase in revenue from maintained liberalism) – which we did not consider in the main text – makes  $\tau_L$  somewhat less attractive relative to  $\tau_P$  and therefore increases the ability level of the indifferent voter relative to the case in which tariff revenue is discarded. This rightward shift in  $\tilde{a}$  may jeopardize the political stability of the liberal regime while strengthening the stability of the more protectionist tariff. And indeed, if both tariff regimes constituted political steady states when ignoring tariff revenue, it is possible that uniform redistribution of the collected tariff receipts

<sup>48</sup> Normative economics would suggest that this case is the more relevant, in which liberalization brings a concomitant loss in tariff revenue. Note that the opposite case is simply the mirror image.

could completely undercut the political stability of the liberal regime so that the  $\tau_p$  would constitute the unique political steady state.

In sum, while the redistribution of tariff revenue in general will influence the identity of the indifferent voter within the population and thus the potential multiplicity of political steady states given any set of exogenous parameter values, it does not change the qualitative conclusions of the main text.

**Appendix A3. Existence of multiple political steady states**

The conditions under which multiple political steady states can obtain naturally depends on parameter values and the choice of tariff alternatives  $\tau_L$  and  $\tau_p$ . A simple graphical exposition proves useful for thinking about the set of possibilities.

Given parameters  $(\alpha, \beta, c, \text{ and } p^w)$ , political equilibrium is reached when at every period  $t$ , the median voter would vote for the contemporary tariff,  $\tau_t$ , that makes her the median voter given the status quo tariff,  $\tau_{t-1}$ . Fig. 6 represents political equilibria as the intersection of two loci in  $(\tau_t, a)$  space: the first maps the identity of the median voter among the young generation given the status quo tariff, and the second identifies each young voter's most preferred tariff. Political equilibrium is reached when the two functions intersect. By considering the influence of parameter values on these loci, we can evaluate the conditions under which multiple political steady states arise.

In each panel of Fig. 6, the dashed lines labeled by  $a^M(\tau_{t-1}, \tau_t)$  map the identity of the median voter as a function of the current tariff,  $\tau_t$ , given the (fixed) status quo tariff,  $\tau_{t-1} \in \{\tau_L, \tau_p\}$ . By Lemma 2.6 and Eq. (2.6):

$$a^M(\tau_{t-1}, \tau_t) = 2 - \frac{\beta + c \left(\frac{\tau_{t-1}}{\tau_t}\right)^\alpha}{\beta p^w} \tau_t, \tag{A3.1}$$

which is monotonically decreasing and convex in  $\tau_t$ . The lower is  $\tau_t$ , the greater the skill composition of generation  $t-1$ , and thus the higher the ability level of the median voter at time  $t$ . The remaining arguments, including  $\tau_{t-1}$ , are shift parameters for the function in  $(\tau_t, a)$  space. Notably, an increase in  $\tau_{t-1}$  will shift the median voter function to the left: the higher the status quo tariff, the lower the implied ability level of the median voter, just as demonstrated in Fig. 3. Thus, the function  $a^M(\tau_p, \tau_t)$  must lie everywhere to the left of  $a^M(\tau_L, \tau_t)$ , as illustrated in each panel of Fig. 6.

The function given by the solid line,  $\tau^o(a)$ , in each panel illustrates each young voter's most preferred tariff as a function of ability level,  $a \in [0, 1]$ . In the binary referendum framework, voters with ability level  $a < \tilde{a}(\tau_L, \tau_p)$  prefer  $\tau_p$  while voters with ability  $a > \tilde{a}(\tau_L, \tau_p)$  prefer  $\tau_L$ . This most preferred tariff mapping is therefore characterized by the step function:

$$\tau^o(a) = \begin{cases} \tau_p, & \text{if } a \leq \tilde{a}(\tau_L, \tau_p); \\ \tau_L, & \text{if } a > \tilde{a}(\tau_L, \tau_p). \end{cases} \tag{A3.2}$$

In our binary referendum framework, the most preferred tariff must by definition take the value of either  $\tau_p$  or  $\tau_L$ , but it is noteworthy that in an unrestricted (continuous) tariff referendum framework, the most preferred tariff function would continue to take a step form due to individuals' polarized tariff preferences. Every voter (save the zero mass indifferent voter) would prefer either the prohibitive tariff or free trade. Thus, it is clear that our binary referendum framework mirrors that of a continuous policy space, since only the boundaries of the support of the policy space would arise as stable equilibrium outcomes. A continuous policy space could potentially give rise to an additional razor's edge equilibrium in which the indifferent voter each period chooses the interior tariff that would ensure her role as median voter. Such an equilibrium would not be stable, however, in the sense

that any marginal deviation from the interior equilibrium tariff would lead to an immediate jump to a boundary tariff equilibrium ( $\tau_L$  or  $\tau_p$ ).

The first two panels of Fig. 6 demonstrate the potential for unique political steady states. In Panel A, any possible median voter arising from either a protectionist status quo or a liberal status quo would prefer  $\tau_L$  over  $\tau_p$ . Or equivalently,  $\tilde{a}(\tau_L, \tau_p)$  lies to the left of the set of possible median voters. In Panel B the reverse holds: starting from either status quo, every potential median voter prefers  $\tau_p$  over  $\tau_L$ .

The case of multiple political steady states is represented in Panels C and D. In both panels, starting from a protectionist regime at  $t-1$ , the median voter who will arise if  $\tau_t = \tau_p$  is implemented prefers  $\tau_p$ , while starting from a liberal status quo, the median voter who would obtain under  $\tau_t = \tau_L$  prefers  $\tau_L$ . Panel D demonstrates additionally the possibility of the organic transition in which, starting from the protectionist status quo tariff, the median voter who would obtain under a liberal regime at time  $t$ ,  $a^M(\tau_p, \tau_L)$  prefers  $\tau_L$ .<sup>49</sup>

Comparing the four panels in Fig. 6 demonstrates the role of parameter values in generating multiple political steady states. Specifically, multiple equilibria will arise as long as the median voter loci,  $a^M(\tau_p, \tau_t)$  and  $a^M(\tau_L, \tau_t)$  span the neighborhood of the indifferent voter. From Eq. (A3.1), it is clear that the discount factor ( $\beta$ ), terms of trade ( $p^w$ ), and cost of education ( $c$ ) can shift the median voter loci to the right or left, by increasing or decreasing the net return to skill acquisition.<sup>50</sup> Increasing the difference between  $\tau_p$  and  $\tau_L$  will shift the two loci farther apart, thus expanding the potential for multiple equilibria to arise, while reducing the scope of tariff alternatives would have the opposite effect.

**References**

Atkin, D. (2010). *Endogenous skill acquisition and export manufacturing in Mexico*. Mimeo.

Bagwell, K., Staiger, R., 1999. An economic theory of the GATT. *American Economic Review* 89 (1), 215–248.

Bagwell, K., Staiger, R., 2002. *The Economics of the World Trading System*. MIT Press, Cambridge, MA.

Bassetto, M., 1999. Political economy of taxation in an overlapping-generations model. Federal Reserve Bank of Minneapolis Discussion Paper no. 133.

Basu, K., Van, P.H., 1998. The economics of child labor. *American Economic Review* 88 (3), 412–427.

Beaulieu, E., Magee, C., 2004. Four simple tests of campaign contributions and trade policy preferences. *Economics and Politics* 16 (2), 163–187.

Benabou, R., 2000. Unequal societies: income distribution and the social contract. *American Economic Review* 90, 96–129.

Blanchard, E., Willmann, G., 2008. Trade, Education, and the Shrinking Middle Class. Working Paper.

Borsook, I., 1987. Earnings, ability and international trade. *Journal of International Economics* 22, 281–295.

Bougheas, S., Riezman, R., 2007. Trade and the distribution of human capital. *Journal of International Economics* 73 (2), 421–433.

Brainard, L., Verdier, T., 1994. Lobbying and adjustment in declining industries. *European Economic Review* 38, 586–595.

Brainard, L., Verdier, T., 1997. The political economy of declining industries: senescent industry collapse revisited. *Journal of International Economics* 42, 221–238.

Cassing, J., Hillman, A.L., 1986. Shifting comparative advantage and senescent industry collapse. *American Economic Review* 76 (3), 516–523.

Chisik, R., 2003. Export industry policy and reputational comparative advantage. *Journal of International Economics* 59, 423–451.

Davidson, C., Matusz, S., Nelson, D., 2007. Can compensation save free trade. *Journal of International Economics* 71 (1), 167–186.

Eicher, T.S., 1996. Interaction between endogenous human capital and technological change. *Review of Economic Studies* 63 (1), 127–144.

Falvey, R., Greenaway, D., Silva, J., 2010. Trade liberalization and human capital adjustment. *Journal of International Economics* 81, 230–239.

Fernandez, R., Rodrik, D., 1991. Resistance to reform: status quo bias in the presence of individual specific uncertainty. *American Economic Review* 81, 1146–1152.

Findlay, R., Kierzkowski, H., 1983. International trade and human capital: a simple general equilibrium model. *Journal of Political Economy* 91 (6), 957–978.

<sup>49</sup> Recall that rational expectations and perfect foresight rule out equilibria in which the median voter is the agent with ability level  $a^M = \theta(\tau_L, \tau_p)$ , since a young voter at time  $t$  would never vote for  $\tau_L$  at time  $t$  if the (correctly anticipated) next period tariff is  $\tau_p$ . Since it is of little consequence,  $a^M(\tau_L, \tau_p)$  is not labeled in the figures. It is straightforward to verify that  $a^M(\tau_L, \tau_p) \in (a^M(\tau_p, \tau_p), a^M(\tau_p, \tau_L))$ , as depicted.

<sup>50</sup> The role of  $\alpha$  is less transparent, as it influences the slope of the median voter function only when  $\tau_t$  differs from  $\tau_{t-1}$ .

- Glomm, G., Ravikumar, B., 1995. Endogenous public policy and multiple equilibria. *European Journal of Political Economy* 11, 653–662.
- Grossman, G.M., Helpman, E., 1994. Protection for sale. *American Economic Review* 84 (4), 833–850.
- Hassler, J., Rodríguez Mora, J.V., Storesletten, K., Zilibotti, F., 2003a. The survival of the welfare state. *American Economic Review* 93, 87–112.
- Hassler, J., Storesletten, K., Zilibotti, F., 2003b. Democratic public good provision. CEPR Working Paper No. 4044. September.
- Hassler, J., Storesletten, K., Zilibotti, F., 2007. Democratic public good provision. *Journal of Economic Theory* 133 (1), 127–151 (March).
- Hickman, D. and W. Olney (2010). *Globalization and investment in human capital*. Mimeo.
- Irwin, D., 1998. From Smoot–Hawley to reciprocal trade agreements: changing the course of U.S. trade policy in the 1930s. In: Bordo, M., Goldin, C., White, E. (Eds.), *The Defining Moment: The Great Depression and the American Economy*. University of Chicago Press, Chicago, IL.
- Krishna, P., Mitra, D., 2005. Reciprocated unilateralism in trade policy. *Journal of International Economics* 65 (2), 461–487.
- Krishna, P., Mitra, D., 2008. Reciprocated unilateralism in trade reforms with majority voting. *Journal of Development Economics* 85 (1), 76–84.
- Krishna, V., Morgan, J., 2010. Overcoming Ideological Bias in Elections. Working Paper.
- Krusell, P., Ríos-Rull, J., 1996. Vested interests in a positive theory of stagnation and growth. *Review of Economic Studies* 62, 301–329.
- Krusell, P., Quadrini, V., Ríos-Rull, J., 1996. Are consumption taxes really better than income taxes? *Journal of Monetary Economics* 37, 475–503.
- Lederman, D., 2005. *Political Economy of Protectionism: Theory and the Chilean Experience*. Stanford University Press, Palo Alto, CA.
- Long, N.V., Riezman, R., Soubeyran, A., 2007. Trade, wage gaps, and specific human capital accumulation. *Review of International Economics* 15 (1), 75–92.
- Magee, C., 2003. Endogenous tariffs and trade adjustment assistance. *Journal of International Economics* 60, 203–222.
- Maggi, G., Rodríguez-Clare, A., 2007. A political-economy theory of trade agreements. *American Economic Review* 97 (4), 1374–1406 (September).
- Maggi, G., Rodríguez-Clare, A., 1998. The value of trade agreements in the presence of political pressures. *Journal of Political Economy* 106, 574–601.
- Matsuyama, K., 1992. A simple model of sectoral adjustment. *Review of Economic Studies* 59, 375–387.
- Mayer, W., 1984. Endogenous tariff formation. *American Economic Review* 74, 970–985.
- McLaren, J., 1997. Size, sunk cost, and Judge Bowker's objection to free trade. *American Economic Review* 86 (3), 400–419.
- McLaren, J., 2002. A theory of insidious regionalism. *Quarterly Journal of Economics* 117, 571–608.
- Moro, A. and Norman, P., 2004. *Endogenous comparative advantage*. Mimeo (February).
- Ortega, F. (2004). *Immigration and the survival of the welfare state*. Mimeo.
- Saint Paul, G., 2001. The dynamics of exclusion and fiscal conservatism. *Review of Economic Dynamics* 4, 155–168.
- Saint Paul, G., Verdier, T., 1997. Power, distributive conflicts, and multiple growth paths. *Journal of Economic Growth* 2, 155–168.
- Scheve, K., Slaughter, M., 2001. What determines individual trade-policy preferences? *Journal of International Economics* 54, 267–292.
- Schonhardt-Bailey, C., 2006. *From the Corn Laws to Free Trade*. MIT Press, Cambridge, MA.
- Staiger, R., Tabellini, G., 1987. Discretionary trade policy and excessive protection. *American Economic Review* 77, 823–837.
- Willmann, G., 2004. Pareto gains from trade: a dynamic counter-example. *Economics Letters* 83, 199–204.