Unequal Gains, Prolonged Pain: Dynamic Adjustment Costs and Protectionist Overshooting

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PRELIMINARY

Abstract

We examine the influence of labor market frictions on democratic political responses, and demonstrate the potential for *protectionist overshooting*, a phenomenon by which an unanticipated permanent terms of trade *improvement* generates a sharp spike in protectionism that only gradually diminishes over time. Our dynamic political economy model features overlapping generations, heterogeneous agents, endogenous human capital investment, and costly worker adjustment. We show that when politically decisive workers are 'stuck' in adversely affected import-competing sectors, they will advocate successfully for short-run policy remediation in the form of higher tariffs; the induced protectionism subsequently slows the process of endogenous worker adjustment as the incentive to leave the senescent sectors is blunted for younger workers. The more unequal the initial distribution of gains and losses from the terms of trade shock among the population, the greater the magnitude of potential overshooting will be and thus the longer the induced policy distortion will persist: unequal gains, prolonged pain.

Keywords: Dynamic Political Economy, Adjustment Costs, Tariffs, Human Capital Acquisition, Overshooting

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1 Introduction

In response to recent global economic challenges, many observers fear that a protectionist reaction could be around the corner. Last year's report by the World Trade Organization (WTO) and more recent studies by the independent monitoring group Global Trade Alert suggest that such a retrenchment is already underway.[1] Even as the recession abates, the protectionist tide seems to be rising: earlier this year, Pascal Lamy, then the WTO Director General, warned "The threat of protectionism may be greater now than at any time since the start of the crisis, since other policies to restore growth have been tried and found wanting."[2]

Economists often seem perplexed by this sort of protectionist antagonism, pointing to the undeniable aggregate gains from freer trade and arguing that in the long run, many if not all individuals should be able to share in the gains from greater openness as wages are competed up by growing export-oriented industries and service sectors fueled by rising income levels. Politicians, meanwhile, tend to emphasize the short-run. Right *now* there is little doubt that at least a handful of decisive political constituencies (not least large segments of politically pivotal middle classes) are short-run net losers from greater global pressure in import-competing sectors, and may – at least in the short term – benefit from greater barriers to trade. The important recent empirical work by Autor, Dorn, and Hanson (2013) and Autor, Dorn, Hanson, and Song (2013) highlights the high cost and slow pace of adjustment faced by U.S. workers in response to increasing foreign competition.

There is a disconnect between the reality of slow economic adjustment and rapid political reaction. In this paper, we argue that this difference in the speed of adjustment – the potential fluidity of populist politics versus often much slower dynamics of structural economic change – can play a central role in shaping politics and policy decisions during periods of transition. We design a model with which we can look beyond steady states to study political transition paths in the presence of labor market frictions. Our framework

[1] See in particular chart 1(b) the in the WTO Director General's report from June 29, 2012 or Global Trade Alert's Pre-G8 Summit Report from June 2013, "Protectionism's Quiet Return" at www.globaltradealert.org.

[2] Reuters, April 10, 2013: www.reuters.com/article/2013/04/10/us-trade-wto-idUSBRE9390AO20130410

highlights the interaction of short-run economic and political adjustment processes that play out in reaction to exogenous shocks, and allows us to identify a previously unappreciated determinant of how countries will respond to changes in the global marketplace: how gains or losses from exogenous shocks are initially distributed across individuals (or more broadly, political constituencies) within a democracy.

The model highlights the crucial role of adjustment frictions that limit how quickly individuals can shift their human capital investments in response to changing labor market conditions. We contrast the slow pace of potential economic adjustment with the relative speed with which political sentiment can reverse course, and demonstrate that the differential 'stickiness' between economic and political change can lead to policy volatility and the potential for *protectionist overshooting*: a sharp surge in protectionism that slows the process of political and economic adjustment for generations to come.[3] Slower adjustment is costly; by prolonging the adjustment process, aggregate gains from trade are lost. Putting it together, we argue that the more unequal the distribution of gains and losses form a macroeconomic shock, the greater the potential initial protectionist response to the terms of trade change and the more costly the adjustment process: unequal gains, prolonged pain.

Formally, we develop an overlapping generations model with endogenous dynamic political responses to external shocks. In our model, two-period lived heterogeneous agents decide how much costly education to acquire during the first period of their lives, while reaping the benefits of their human capital investment in the second period. Trade policy is determined anew each period through majority voting; the decisive (median) voter at the time decides the policy for the period based on her previous human capital investment decisions and the terms of trade. Thus, the equilibrium policy outcome in each period is determined by the human capital decisions from the previous period. The central importance of the *existing* stock of human capital on *current* trade policy decisions introduces a form

[3]Our use of the term *overshooting* is intentionally in deference to Dornbusch (1976). Whereas exchange rate overshooting in Dornbusch (1976) is generated by the marriage of sticky prices (the gradual realization of inflationary pressure) with the immediate response of expectations, our endogenous tariff dynamics are generated by sticky labor markets and the immediate political response.

of political hysteresis, even in the presence of perfect foresight and rational expectations.[4] Modeling trade policy as an ad-valorem tariff in two-good small country framework, we show that starting from a political steady state tariff level with a positive, non-prohibitive tariff level and an import-competing median voter, an exogenous aggregate terms of trade *improvement* for the country will lead to protectionist overshooting: an immediate sharp increase in the tariff, followed thereafter by a slow decline in the tariff level converging to the new steady state tariff level as subsequent generations of agents gradually invest more in human capital, adjusting to the new macroeconomic environment. Protectionist overshooting will arise even if the new steady state tariff is *more liberal* than the initial steady state.

Stepping back from the theory, we then offer a brief and admittedly loose interpretation of recent data from the United States. The model guides us to look for evidence of two necessary conditions, which if satisfied would predict protectionist overshooting response to recent global economic conditions. The first condition is simply that in the short run, which is necessarily all we can observe, the decisive *median voter is more protectionist than the representative*, or 'average' voter; in essence, we look at the evidence for 'unequal gains', and find strong support based on recent census data. Second, the median voter must be *politically enfranchised*. To the extent that trade policy is determined not by popular vote, but by special interest politics, the potential for protectionist overshooting is obviously limited. (Although GATT/WTO bindings prohibit increases in tariffs beyond negotiated limits, trade policy has come to rely increasingly on discrete, temporary measures like anti-dumping duties and safeguards.[5]) Evidence here is more mixed, but even so the balance of evidence suggests protectionist overshooting to be sufficiently plausible to be of practical concern in the United States today. If nothing else, political rhetoric reflects the protectionist sentiment toward China particularly, not least the ominous talk of "currency manipulation."[6]

[4]Unlike Fernandez and Rodrik (1991) political hysteresis in our model is generated in the absence of uncertainty.

[5]Bown and Crowley (2012) find evidence of protectionist response via such temporary trade barriers to recessionary business cycles.

[6]Recent presidential hopeful Mitt Romney famously promised to label China a currency manipulator on

This paper builds on and ties to a number of distinct literatures in trade and political economy. First, in highlighting the important role played by adjustment costs in shaping the gains from (and policy responses to) freer trade, we join the important recent empirical work by Artuc, Chaudhuri, and McLaren (2010) and Autor, Dorn, and Hanson (2013) among others. From the theory side, the trade literature of course knows many dynamic models, perhaps most closely related in its labor market structure the important paper by Matsuyama (1992). Among the dynamic trade literature, very few contributions consider endogenous policy, and none that we know of is structured in a way to admit dynamics akin to overshooting.[7] Most closely, we build on our previous work on dynamic endogenous trade policy in Blanchard and Willmann (2011). While the model in that paper was limited to a binary policy choice, a binary skill acquisition decision, and the analysis of political steady states, we move beyond each of these limitations in the present paper, which allows us to study transition dynamics.

Turning from the trade literature to political economy, we tie to a tradition of addressing dynamic policy questions in the macroeconomics literature – for instance Krusell and Ríos-Rull (1996), Bassetto (1999), Hassler, Rodríguez Mora, Storesletten, and Zilibotti (2003) – but again, this earlier work does not consider the differential adjustment speeds that give rise to our overshooting mechanism. Finally, we echo the recent call by Acemoglu and Robinson (2013) to recognize the feedback effects between economic reforms and political outcomes; in our model, the (economic) distribution of gains and losses following a trade shock influences voting outcomes today and throughout the future, as each generation's policy choices are reflected in subsequent economic (skill acquisition) decisions by later generations.

The paper proceeds as follows. In the next section, we develop a model of protectionist overshooting, building a new dynamic political economy framework with overlapping generations, heterogenous agents, endogenous human capital acquisition, and costly worker

"day one" in office. Frequent speeches from the floor of the U.S. House of Representatives tend be even more impassioned (e.g. U.S. Rep. B. Pascrell H1169; 3/6/2012).

[7] Brainard and Verdier (1997) and Staiger and Tabellini (1987) come the closest, with their seminal work on the political economy of industry collapse and excessive protection, respectively.

adjustment. We map out the basic mechanism that drives overshooting and formally characterize the initial political steady state and transition dynamics following a large permanent terms of trade shock. The model offers a set of empirically measurable necessary conditions that would need to hold for overshooting to relevant in practice. In section 3, we briefly offer evidence that these conditions obtain today in the United States. Section 4 concludes.

2 A Model of Protectionist Overshooting

While our focus is on labor market adjustment costs and the protectionist surges that can result from terms of trade changes, we should emphasize that the fundamental political feedback mechanism is much broader. Policy overshooting can result in any policy environment where there are differential costs of adjustment to macroeconomic shocks, whether costly adjustment of the 'real' economy is due to individuals' human capital accumulation, firms' and consumers' investment decisions, geographic re-location costs, or the stochastic nature of technological innovation.

2.1 The Economic Model

Consider a small open home economy that produces, consumes, and trades two goods: a skill-based good, S, which requires skilled labor to produce, and a basic good, U, produced using unskilled labor. Both goods are produced under perfect competition with constant returns to scale technologies. Let good S be the economy's natural export good. 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 of the skill-based good and $\tau \equiv 1+t$ is defined as one plus the ad-valorem tariff on the imported basic good. We assume that any tariff revenue is rebated uniformly across agents within each generation.[8]

[8]Note that in an overlapping generations framework, when tariff revenue is rebated uniformly among all agents at a point in time, tariffs imply both intra- and *inter*-generational transfers. In the interest of tractability, we purposely abstract from the inter-generational transfer mechanism – which is largely a distraction in this setting – by assuming tariff revenue rebates only within each generation.

The home country is populated by a continuum of heterogeneous agents. Individuals live for two periods; thus at any point in time, two generations, the 'young' and the 'old', comprise the total population; and the population of each generation is normalized to one. We refer to the generation that is young at time t as 'generation t' hereafter. Within each generation individual agents differ in their inherent ability levels, a, assumed to be distributed continuously over the unit interval with cumulative distribution function $F(a)$ and corresponding density function $f(a)$. Agent $a = 0$ is the least able of her generation, and agent $a = 1$ the most able. Agents have rational expectations and perfect foresight.[9]

Every agent is endowed with one unit of labor in each period of life and is born unskilled. When young, each individual may choose whether to acquire human capital via costly education. Schooling takes time, and so the cost of human capital is the foregone income that could have been earned working in the unskilled sector if not for time in the classroom. There are no additional pecuniary costs of education, and education yields no return until the second period of life, when it manifests as human capital. Agents may allocate anywhere from none to all of their per-period (unit) labor endowment to schooling. Denoting unskilled labor allocation by l, and duration of education by e, the within-period time constraint is:

$$l + e = 1. \tag{2.1}$$

Education is an investment: the cost is borne during youth, while the benefits accrue in the future. Thus, in this simple two-period overlapping generations framework the old have no incentive to acquire additional education in the second period of life. Our simple structure is thus effectively an extreme case of putty-clay skill 'stickiness' as in Matsuyama (1992).[10]

[9] Uncertainty over future policy outcomes would introduce additional policy hysteresis via the uncertainty-driven status-quo bias mechanism à la Fernandez and Rodrik (1991) or Jain and Mukand (2003); our mechanism obtains despite the absence of uncertainty.

[10] More generally, we could assume only that the adjustment cost increases as a worker gets older. What is crucial for our key mechanism and results is simply that economic adjustment is slower than political change: skill stickiness is one of many ways to establish this sort of economic hysteresis in the (human)

The technology for basic good production is deliberately simple: one unit of unskilled labor produces one unit of the basic (numéraire) good regardless of the worker's inherent ability level, so that the unskilled wage is normalized to one. Producing the skill-based good requires human capital, h. Let an individual's output of the skill-based good, $x^s(h)$, be a linear, strictly increasing function of her human capital level:

$$x^s(h) = bh \qquad \text{with} \qquad b > 0. \tag{2.2}$$

A type-a worker's human capital in the second stage of life is strictly increasing both on her innate ability, a, and the extent of education she acquired when young, e. We assume that education and inherent ability are complementary in realized human capital, that is, h is super-modular in a and e, and that the human capital return to education is strictly concave.[11] Our assumptions over human capital accumulation are summarized as follows:

Assumption 1.

$$\frac{\partial h(a,e)}{\partial a} > 0; \qquad \frac{\partial h(a,e)}{\partial e} > 0; \tag{2.3}$$

$$\frac{\partial^2 h(a,e)}{\partial a \partial e} > 0; \qquad \frac{\partial^2 h(a,e)}{\partial e^2} < 0. \tag{2.4}$$

Education and Production. Each agent chooses her education level to maximize her lifetime indirect utility. Preferences are identical across individuals and functionally separable across time. Let each agent's lifetime utility function be given by:

$$u(x_u^y, x_s^y) + \beta u(x_u^o, x_s^o), \tag{2.5}$$

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. It proves analytically convenient to adopt, in addition, homotheticity of within-period preferences, so that the intra-temporal indirect utility function may be written as

capital stock.

[11] The complementarity assumption generates the single crossing condition necessary to ensure that higher ability workers self-select into higher education levels (assortive matching), while concavity yields the second order condition for individuals' optimal education decisions.

$v(p, I) \equiv v(p)I$, where I denotes current nominal income. A key advantage of this functional form is that it allows us to focus on the skill acquisition decision by abstracting from consumption smoothing.[12]

Recall that all agents are born unskilled, and that the unskilled wage is normalized to one. The nominal earnings for a young worker of generation t are therefore given by his time in the unskilled labor force, or equivalently one less his chosen education level. Adding in the intra-generational tariff revenue rebate, $R_t^y(\tau_t) \equiv (\tau_t - 1)M_t^y$, (where M_t^y denotes the young generation's volume of basic good imports at time t), total nominal income for the young worker at time t is then: $I_t^y(a) = l_t(a) + R_t^y = 1 - e_t(a) + R_t^y$. For notational convenience, we interpret earnings in the second period of life as the unskilled wage for the full unit labor endowment, regardless of education level, plus any additional earnings from skilled good production that accrues to acquired human capital, plus tariff revenue stemming from basic goods imports of the old. For the young worker of generation t and ability level a, her anticipated income in the second period of life is: $I_{t+1}^o(a, e_t(a)) = 1+x^s(h(a, e_t(a)))p_{t+1}+R_{t+1}^o$. One can interpret $x^s(\cdot)p$ as the skill premium paid to workers, which is increasing (multiplicatively) in human capital and the relative price of the skill-based good.

Given current and expected prices, the opportunity cost of education, and the future returns to human capital, every agent a of each generation t agent chooses her optimal level of education to solve:

$$\max_e \quad v(p_t, I_t^y(e)) + \beta v(p_{t+1}, I_{t+1}^o(h(a, e), p_{t+1})), \text{ or} \tag{2.6}$$

$$\max_e \quad v(p_t)[1 - e + R_t^y] + \beta v(p_{t+1})[1 + x^s(h(a, e))p_{t+1} + R_{t+1}^o], \tag{2.7}$$

which has the associated first order condition (Euler equation):

$$\beta x_h^s \frac{\partial h(a, e)}{\partial e} p_{t+1} = \frac{v(p_t)}{v(p_{t+1})}. \tag{2.8}$$

Solving yields the optimal education level as a function of ability type, current, and future

[12] Under constant marginal utility of income, agents' skill acquisition decisions are orthogonal to savings and wealth. Note that the presence of a perfect credit market would also silence the effect of a consumption smoothing motive on education decisions.

prices:

$$e(a; p_t, p_{t+1}) \equiv h_e^{-1}\left(a, \left(\frac{v(p_t)}{v(p_{t+1})}\frac{1}{\beta p_{t+1} x_h^s}\right)\right), \tag{2.9}$$

where $h_e^{-1}(\cdot)$ indicates the inverse of the first derivative of $h(a,e)$ with respect to e.

Our assumptions over human capital formation, $h(a,e)$, ensure existence and uniqueness of the optimal education function, $e(a; p_t, p_{t+1})$.[13] Moreover,

Lemma 2.1. *The optimal education choice, $e(a; p_t, p_{t+1})$, is strictly increasing in the agent's ability level, a, the discount factor, β, and the current and (expected) future relative price of the skill based good, p_t and p_{t+1}.*

Proof. The signs of these effects follow directly from totally differentiating the first order condition (2.8), Assumption 1, and the properties of the indirect utility function:

$$\frac{\partial e}{\partial a} = -\frac{h_{ea}}{h_{ea}} > 0, \tag{2.10}$$

$$\frac{\partial e}{\partial \beta} = -\frac{h_e}{\beta h_{ee}} > 0, \tag{2.11}$$

$$\frac{\partial e}{\partial p_t} = \frac{v_p(p_t)/v(p_{t+1})}{\beta b h_{ee} p_{t+1}} > 0, \tag{2.12}$$

$$\frac{\partial e}{\partial p_{t+1}} = \frac{h_e(share^s - 1)}{h_{ee} p_{t+1}} > 0, \tag{2.13}$$

where $share^s$ is the expenditure share on the skilled good when old which enters via Roy's identity. □

Intuitively, an agent's optimal education level increases with her inherent ability due to the assumed complementarity between education and a. The more an agent values the future relative to the present, i.e. the greater is β, the greater her incentive to invest in education today. A higher price today prompts agents to shift consumption into the future, which they do by educating more. Finally, a higher price in the future has the opposite effect on intertemporal consumption, but this is dominated by the positive effect of the increased

[13] Specifically, the strict monotonicity and concavity of $h(a,e)$ in e guarantees both the invertability of h_e with respect to e (existence), and strict inequality for the second order condition of (2.6) (uniqueness).

return to education. Note that a (uniform) tariff revenue rebate will not influence agents' skill acquisition decisions under our assumption of constant marginal utility of income.

Aggregating across all agents of both generations at a given time t yields the output of each good, q_t^s and q_t^u. (Recall that young agents provide unskilled labor only when not in school, while all older agents regardless of ability or education are assumed to produce one unit of unskilled output in addition to any skilled-good output derived from acquired human capital.) The following summarizes the equilibrium outcome of the model developed so far, taking prices as exogenous.

Definition 2.1. *Given a world price sequence $(p_t^w)_{t\in\mathbb{N}}$ and a tariff sequence $(\tau_t)_{t\in\mathbb{N}}$, an **economic equilibrium** is a list of education decisions by every agent $a \in [0,1]$*

$$e_t(a) \equiv e_t(a; p_t, p_{t+1}) = h_e^{-1}\left(a, \left(\frac{v(p_t)}{v(p_{t+1})}\frac{1}{\beta p_{t+1} x_h^s}\right)\right) \quad \forall a \in [0,1], \forall t \tag{2.14}$$

and associated quantities of each good produced

$$q_t^u = q^u(p_t, p_{t+1}) = \left(1 - \int_0^1 e_t(a; p_t, p_{t+1}) f(a) da\right) + 1 \quad \forall t \tag{2.15}$$

$$q_t^s = q^s(p_{t-1}, p_t) = \int_0^1 x^s(h(a, e_{t-1}(a; p_{t-1}, p_t))) f(a) da. \quad \forall t \tag{2.16}$$

for every period t in time.

Notice that unskilled output depends on current and future prices (via the young cohort's education choices), whereas skilled output depends on past and current prices via the older generation's previous education decisions.

An *economic steady state* is then simply an economic equilibrium that obtains under a constant world price p^w and a constant tariff τ, such that the domestic price is constant. We formalize the steady state as a function of the tariff, the policy instrument at the center of the remaining analysis:

Definition 2.2. *Given a constant world price p^w and a constant tariff τ, an **economic steady state** is a list of constant education decisions*

$$e(a; \tau) = h_e^{-1}\left(a, \left(\frac{\tau}{\beta p^w x_h^s}\right)\right), \quad \forall a \in [0,1] \tag{2.17}$$

and constant associated output quantities

$$q^u(\tau) = \left(1 - \int_0^1 e(a;\tau)f(a)da\right) + 1 \tag{2.18}$$

$$q^s(\tau) = \int_0^1 x^s(h(a, e(a;\tau)))f(a)da \tag{2.19}$$

that obtain at every period t in time.

Finally, note that in our small open economy setting, national income is maximized under the free trade economic steady state; i.e. (2.17)-(2.19) evaluated at $\tau = 1$.

2.2 The Political Process

We model the political process as a direct democracy over trade policy, in which only the old generation holds suffrage rights.[14] At the beginning of each period,voters choose the current period's trade policy, which subsequently determines the price level and real return to human capital for that period. The vote each period takes place before (young) agents decide on skill acquisition and before production and consumption occurs. The diagram below illustrates the within-period sequencing.

Before proceeding, we investigate the tariff preferences of the electorate. As a function of ability level, a, and (previously chosen) education level, $e_{t-1}(a)$, each (old) agent's most

[14] As Hassler, Storesletten, and Zilibotti (2007) point out, this is observationally equivalent to the assumption that elections are held at the end of each period, at which point policy is set for the subsequent period; the old are then assumed to abstain because they have no interest in the election. See Blanchard and Willmann (2011) and Hassler, Storesletten, and Zilibotti (2003) for a models in which both the young and old generations have suffrage rights. In the former model, voting interests overlap across generations, as they would here, but a binary referendum framework keeps the model tractable; in the latter, the young side universally with the old poor in taxing the old rich, again, ensuring tractability.

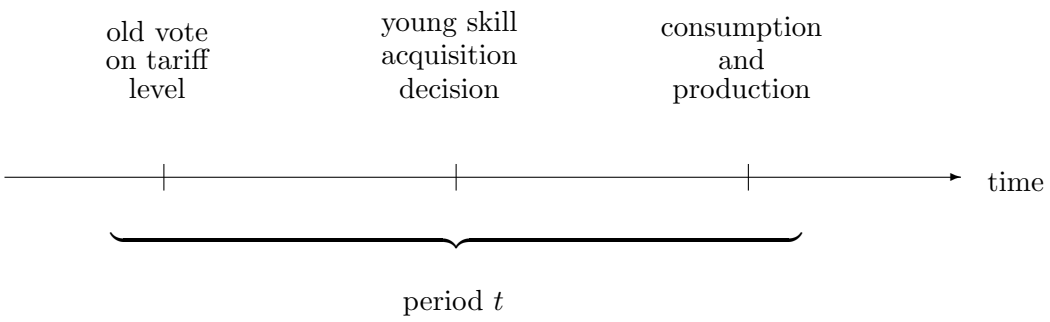


Figure 1: Within-period Sequencing.

preferred trade policy at time t is given implicitly by:[15]

$$\tau_t^o(a; e_{t-1}(a)) = \arg\max_{\tau_t} \quad V^o\big(p_t, I_t^o(a, e_{t-1}(a))\big) \quad \text{s.t.} \tag{2.20}$$
$$I_t^o(a, e_{t-1}(a)) = 1 + x^s(h(a, e_{t-1}(a)))p_t + R_t^o(\tau_t)], \text{ and}$$
$$R_t^o(\tau_t) = \frac{\tau_t - 1}{\tau_t} M_t^{o,u}(\tau_t).$$

Using Roy's identity and the balanced trade condition, the first order condition of the maximization problem can be written as:

$$V_\tau^o = v_I \left([\underbrace{x_t^{o,s}(a) - d_t^{o,s}(a)}_{\equiv E_t^{o,s}(a)} - E_t^{o,s}] \frac{\partial p_t}{\partial \tau_t} + tp \frac{dE_t^{o,s}}{d\tau_t} \right) = 0, \tag{2.21}$$

where $E_t^{o,s}$ denotes the representative (or average) old generation per person export volume of the skilled good, and $E_t^{o,s}(a)$ indicates the net export position of an individual with ability level a. Rewriting again yields:

$$V_\tau^o = v_I \underbrace{\left(\underbrace{[E_t^{o,s}(a) - E_t^{o,s}]}_{\equiv \Delta_t^{o,s}(a)} \underbrace{\frac{\partial p_t}{\partial \tau_t}}_{(-)} \right)}_{\text{individual bias}} + \underbrace{tp \frac{dE_t^{o,s}}{d\tau_t}}_{=0@t=0} = 0. \tag{2.22}$$
$$\text{optimal tariff}$$

From here, the role of individual level heterogeneity is immediate. Relatively unskilled individuals — those whose excess supply of the skill intensive good falls short of the average

[15]Note that with tariff revenue applied to the numéraire good, the world relative price to which the ad-valorem tariff is applied is $p^{u,w} = \frac{1}{\tau}$.

among their generation so that $\Delta^{o,s}(a) < 0$ — prefer a strictly positive tariff.[16] Conversely, higher ability agents are greater net sellers of the skill based good (i.e. $\Delta^{o,s}(a) > 0$) and thus advocates for freer trade (and indeed, import subsidies). It is only a razor's edge, threshold "representative" agent whose individual net export level mirrors that of her entire generation ($E_t^{o,s}(\hat{a}) = E_t^{o,s}$) who would vote for free trade.

Formally, we totally differentiate the first order condition (2.22) in order to obtain the following key result over trade policy preferences:

Lemma 2.2. *The preferred tariff of an old individual, $\tau_t^o(a; e_{t-1}(a))$, is decreasing in both arguments, $\frac{\partial \tau_t^o(a;e_{t-1}(a))}{\partial a} < 0$ and $\frac{\partial \tau_t^o(a;e_{t-1}(a))}{\partial e_{t-1}(a)} < 0$. Furthermore, the total derivative with respect to the individual's ability level a is negative, $\frac{d\tau_t^o}{da} < 0$*

Proof. The three results are related according to $\frac{d\tau_t^o}{da} = \frac{\partial \tau_t^o}{\partial a} + \frac{\partial \tau_t^o}{\partial e_{t-1}} \times \frac{\partial e_{t-1}}{\partial a}$. Since the last factor is positive by Lemma 2.1, we only need to establish the signs of the partial derivatives. From the first order condition (2.22) we have that $\frac{\partial \tau_t^o}{\partial a} = -\frac{V_{\tau a}}{V_{\tau\tau}}$ and $\frac{\partial \tau_t^o}{\partial e_{t-1}} = -\frac{V_{\tau e_{t-s}}}{V_{\tau\tau}}$. The denominator is negative by the second order condition. $V_{\tau a}$ is positive as $\frac{\partial \Delta^{o,s}(a)}{\partial a} > 0$ because both goods are normal due to homotheticity. $V_{\tau e_{t-1}}$ is positive as $\frac{\partial \Delta^{o,s}(a)}{\partial e_{t-s}} > 0$ because the effect on supply and hence income dominates the resulting income effect on the individual's consumption, which follows from the budget constraint and the normality of both goods. □

Expressed in words, the lemma says that the most preferred tariff declines monotonically in the (old) individuals' ability level which we view as a rather intuitive result. Having analyzed individual preferences over the tariff, we are now in a position to proceed with the outline of the political process that determines intertemporal trade policy.

We assume that trade policy is determined by majority vote. Every agent votes for her most preferred tariff policy, $\tau \in (0, \tau^P]$, where τ^P denotes the prohibitive tariff level (and hence a return to autarky) and any $\tau < 1$ indicates an import subsidy. Because of the

[16] Starting from free trade, the standard optimal tariff component of the first order condition is zero (reflecting the infinitesimal marginal distortionary cost at free trade), so that $\forall a$ s.t. $\Delta^{o,s}(a) < 0$, $V_\tau(\tau = 1) > 0$.

single-peakedness of the individuals' preferences over the tariff, the median voter, hereafter denoted by superscript ^{M}, is decisive. We restrict attention to sincere (and implicitly compulsory) voting to rule out nuisance equilibria. Finally, let there be no bureaucratic or time cost of changing tariff regimes.

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 the median voter's most preferred tariff policy.[17] Moreover, because the median voter at time t is a member of the older cohort (generation $t-1$), her most preferred trade policy is independent of future trade policy;[18] the trade policy outcome at time t is therefore decided by the distribution of human capital among generation $t-1$, so that $e_{t-1}(a)$ acts as the relevant state variable at time t. Second, we recall that each generation's educational decision rule, as a function of ability type, is determined by current and expected prices under rational expectations according to (2.9). Using $e^M_{t-1} \equiv e_{t-1}(a^M)$ to denote the median voter's education level, we may define equilibrium as follows:

Definition 2.3. *Given a world price sequence $(p^w_t)_{t\in\mathbb{N}}$, a rational expectations **political equilibrium** is a sequence of tariff and education rule pairs, $(\tau_t, e_t(a))_{t\in\mathbb{N}}$ such that starting from $e_0(a)$ for all $a \in [0,1]$ the following holds for all $t \in \mathbb{N}$:*

1. $\tau_t = \quad \arg\max_{\tau_t} \quad V^o(\tau_t; a^M, e^M_{t-1}) = v(p_t(\tau_t))[1 + x^s(h(a^M, e^M_{t-1}))p_t(\tau_t) + R(\tau_t)]$
   and
2. $e_t(a) = h_e^{-1}\left(a, \left(\frac{v(p_t)}{v(p_{t+1})}\frac{\tau_{t+1}}{\beta p^w x^s_h}\right)\right)$,

where $V^o(\cdot)$ denotes the indirect utility of an older voter in the second period of her life.

[17] Notice that the montonicity of trade policy preferences demonstrated under Lemma 2.2 ensures the median voter result.

[18] Our small open economy assumption means that today's local prices are determined by only today's tariff and world price; young education decisions (which do depend on future prices) are thus immaterial to older voters.

The first condition requires that the equilibrium realized tariff maximizes the indirect utility of the (older) median voter in every period, t. (Note that the optimal policy generally depends on the aggregate older education level (not just the median) through tariff revenue, $R_t(\cdot)$.) The second condition in turn requires that individuals' skill acquisition strategies are optimal under rational expectations of the current and future equilibrium tariffs. It is worth noting that because the optimal tariff rule is independent of future expectations we do not need to restrict attention to Markov Perfect equilibria, as is customary in many similar models; nuisance equilibria are already ruled out by the model's structure.

We can now define a *political steady state* as an economic steady state in which the status quo trade policy is perpetuated under the existing political process. Formally,

Definition 2.4. *A **political steady state** is characterized by equations* (2.17) – (2.19) *and a sequence of constant tariffs* $(\tau_t = \tau)_{t\in\mathbb{N}}$ *that jointly satisfy Definition 2.3. Notice that a political steady state can be summarized by the steady state education level of the median voter and concomitant policy outcome pair,* $(\tilde{e}^M, \tilde{\tau})$*:*

$$\tilde{e}^M = h_e^{-1}\left(a^M, \left(\frac{\tilde{\tau}}{\beta p^w x_h^s}\right)\right) \tag{2.23}$$

$$\tilde{\tau} = \arg\max_{\tau} \quad V^o(\tau; a^M, \tilde{e}^M). \tag{2.24}$$

Steady State Properties. From Lemma 2.2 we know that the tariff chosen by the median voter is decreasing in the median voter's education level, while by Lemma 2.1 the median voter's education level is decreasing in the tariff. A unique, stable steady state exists, therefore, if and only if the steady state education function, $e^M(\tau)$, crosses the tariff function, $\tau(e^M)$, once (and only once) from above over the unit interval (the support of e^M). Hereafter we will use the notation $(\tilde{e}^M, \tilde{\tau})$ to denote the steady state equilibrium median voter education, trade policy pair. The following graph illustrates.

In order to guarantee the existence of a unique, stable political steady state, we make the following (sufficient) assumption:

Assumption 2.

$$\lim_{e\to 0} h_e(a^M, e) = \infty, \quad \lim_{e\to 1} h_e(a^M, e) = 0 \tag{2.25}$$

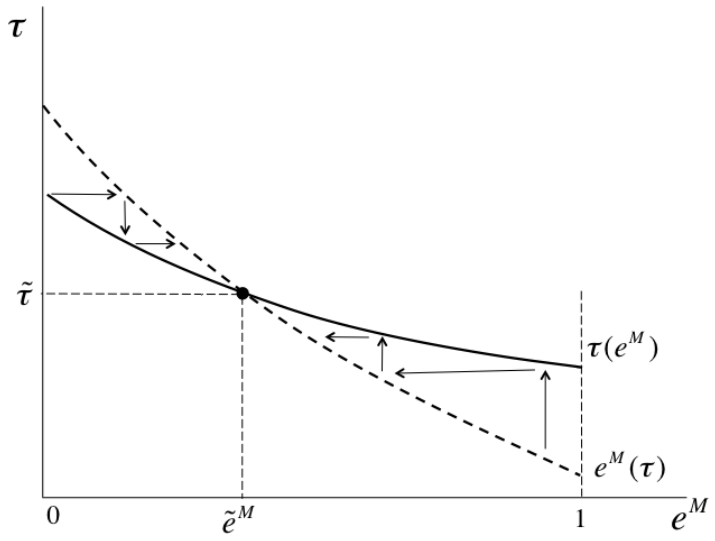


Figure 2: Unique Stable Steady State

$$\frac{d\tau^o}{de} \equiv -\frac{V^o_{\tau e}}{V^o_{\tau\tau}}\bigg|_{a^M,\tau^o(a^M)} < \beta b h_{ee} p^w\big|_{a^M,e^o(a^M)} \equiv \frac{d\tau}{de^M} \tag{2.26}$$

The Inada-style conditions on $h(a^M, e)$ imply that extreme values of the tariff are required to drive the median towards no or full-time education. In this way, they ensure that the $e^M(\tau)$ schedule (which in steady state takes the form $\beta p^w b h_e(a^M, e)$ when inverted to solve for τ) lies above (below) the tariff schedule for $e^M = 0$ ($e^M = 1$) as depicted in Figure 2. The slope condition (2.26) ensures that the steady state education locus is strictly steeper than the steady state tariff locus in $\{e^M, \tau\}$ space. Intuitively, this condition implies that the median voter's optimal education and most preferred tariff levels are not too sensitive to each other. Looking at the numerator on the LHS, this is more likely the case if the relative position of the median is not too sensitive to educational choice. One possible interpretation is that ability is also an important determinant of human capital, implying a smaller role for education. As for the RHS, the condition tends to be satisfied if there is enough curvature in $h(a, e)$ w.r.t. e which implies that a tariff change does not shift educational choice too much.

3 Policy Responses to Exogenous Shocks

We are now positioned to tackle the question posed at the beginning of the paper: how does a democracy, with inherent adjustment costs and intergenerational frictions, respond to an exogenous macroeconomic shock? We consider the effect of a sharp, unanticipated permanent change in the country's terms-of-trade. In particular, we focus on the following scenario, which we find to reflect salient features of the current economic climate in the industrialized world: first, we focus on the case of an aggregate terms of trade *improvement* for the country as a whole — in keeping with the recent decline in the relative prices of less skill-intensive products increasingly produced by the developing world. Second, we focus on a strictly positive initial steady state tariff. This is the case if the median voter is sufficiently uneducated/unskilled that she finds herself in direct competition with imports.[19] Put another way, we consider a scenario where the majority of the gains from increasing trade and openness are concentrated among the elite, highest ability individuals in the country while the politically pivotal median voter will lose from the terms of trade change.[20]

3.1 An unanticipated terms of trade improvement

We begin by tracing the effect of a permanent increase in the country's terms of trade, p^w, on the steady state education and tariff levels. It is intuitive and straightforward to show that *holding the tariff level fixed* the equilibrium education level of the steady state median voter (and all agents, for that matter) will increase: the return to education is strictly increasing in the local relative price of the skill intensive good, so an increase in p^w will necessarily induce every agent to acquire greater human capital, for any given tariff level.

[19] To put this assumption in context, note that the median education level of a U.S. worker is one year beyond high school, and has thus, unsurprisingly, seen significant real wage declines in the last three decades.

[20] Were we instead to consider the case in which the initial steady state trade policy is characterized by an import subsidy, then the median voter at the time of the shock would advocate for an even greater import subsidy. In that case, the equilibrium time path would be characterized by an immediate jump in the import subsidy following the terms of trade shock, followed by steadily increasing subsidies (and thus distortion) as the new, even higher, steady state import subsidy regime is reached.

We thus have the following result:

Lemma 3.1. *The median-voter steady state education locus, $e^M(\tau)$ shifts right in $\{e^M, \tau\}$ space with an increase in p^w, i.e. $\frac{\partial e^M(\tau,p^w)}{\partial p^w}\Big|_\tau > 0$.*

Proof. The result follows directly from Lemma 2.1, noting that an increase in the steady state level of p^w — for a given tariff — increases both p_t and p_{t+1}. □

The effect of the terms of trade improvement on the steady state tariff locus in turn is determined by the relative education level of the median voter. For a highly educated median voter who is already herself a net producer of the skill-intensive good, an increase in the national terms-of-trade will sharpen her free-trade preference. Conversely, for a less educated worker who is a net producer of the *un*skilled good, a further increase in the relative price of the skill intensive good will harden her protectionist stance. Thus, in $\{e^M, \tau\}$ space, the optimal tariff locus for the median (type a^M) voter, will become steeper, pivoting around a threshold education level, that we denote by $\hat{e}^M$, at which the median ability voter's trade policy preference would not change with a (small) shock in p^w.[21] Put differently, an increase in the terms of trade, *holding education levels fixed* will increase the dispersion of trade policy preferences among the electorate.

Lemma 3.2. *The steady state equilibrium tariff locus, $\tau(e^M)$, shifts up (down) in $\{e^M, \tau\}$ space with an increase in p^w, i.e. $\frac{\partial \tau(e^M,p^w)}{\partial p^w}\Big|_{e^M} > 0$ (< 0), if the median voter has a sufficiently low (high) human capital level so that $\tilde{\Delta}(a^M, \tilde{e}(a^M)) \ll 0$ ($\gg 0$).*
At the same time, the increase in the tariff does not fully compensate the terms of trade improvement, i.e. $\frac{\partial p}{\partial p^w}\Big|_{e^M} > 0$.

Proof. The first part follows from the first order condition (2.22). Total differentiation w.r.t. τ and p^w yields $\frac{d\tau}{dp^w} = -\frac{V^o_{\tau p^w}}{V^o_{\tau\tau}}$. Since $V^o_{\tau\tau}$ is negative by assumption ..., the sign depends on $V^o_{\tau p^w} = v_I\left(\frac{d\Delta^{o,s}(a^M)}{dp^w}\frac{dp}{d\tau} + \Delta^{o,s}(a^M)\frac{\partial^2 p}{\partial\tau\partial p^w} + t\frac{d}{dp^w}(p\frac{dE^{o,s}}{d\tau})\right)$. As the first and third term are of second order, the sign is positive (negative) as long as $\Delta^{o,s}(a^M) \ll 0$ ($\gg 0$).

[21] The value of $\hat{e}^M$ is a technical benchmark for where the new and old tariff loci cross, defined implicitly by $\frac{\partial \tau(e^M,p^w)}{\partial p^w}\Big|_{e^M=\hat{e}^M} = 0$.

The second part can be established by contradiction. Suppose the median voter chooses a tariff that completely compensates the terms of trade improvement, so that the domestic price stays unchanged. Consider the derivative of an old voter's indirect utility with respect to the domestic price, $V_p^o = v_I(\Delta^{o,s}(a) + tpdE^{o,s}/dp)$. This derivative is zero in the initial steady state. An increase in p^w and a corresponding increase in τ that leaves p unchanged does not affect the first term because of homotheticity. The second term, however, will increase due to the increase in the tariff (assuming the first order effect dominates the second order effect due to the curvature of tariff revenue). This implies that any old voter prefers an increase in domestic price, i.e the median chooses a less than fully compensating tariff. □

Figure 3 illustrates this shift in the two steady state loci. Starting from an initial steady state at $(\tilde{e}^M, \tilde{\tau})$, the education function $e^M(\tau)$ shifts unambiguously up/rightward for all values of e. The tariff policy function, $\tau(e^M)$, also shifts up/rightward for lower levels of e^M, pivoting around the point $\hat{e}^M$. The new steady state median voter education level then is unambiguously higher, while the tariff can go up or down, depending on the relative changes in the two loci. We summarize this finding in the following proposition:

Proposition 3.1. *Following an unanticipated, permanent increase in p^w, the new steady state median voter education level is higher, i.e. $d\tilde{e}^M/dp^w > 0$. The new steady state tariff level will be higher only if the educational decision is sufficiently insensitive to the price change, and if the median's education level is sufficiently low, else it will be lower.*

Proof. The effect on the steady state education level follows directly from lemmas 3.1 and 3.2, including the result that any tariff increase cannot be fully compensating. As for the second part, insensitivity of the educational decision limits the upward shift of the steady state education level, and the median's educational level has to lie below the threshold, so that the tariff schedule actually shifts up. □

We have now come to a key point of the paper: even though the new steady state will yield higher levels of education and possibly more liberal trade policy, the transition between the two may not — indeed, *will* not — be smooth. The central feature of the

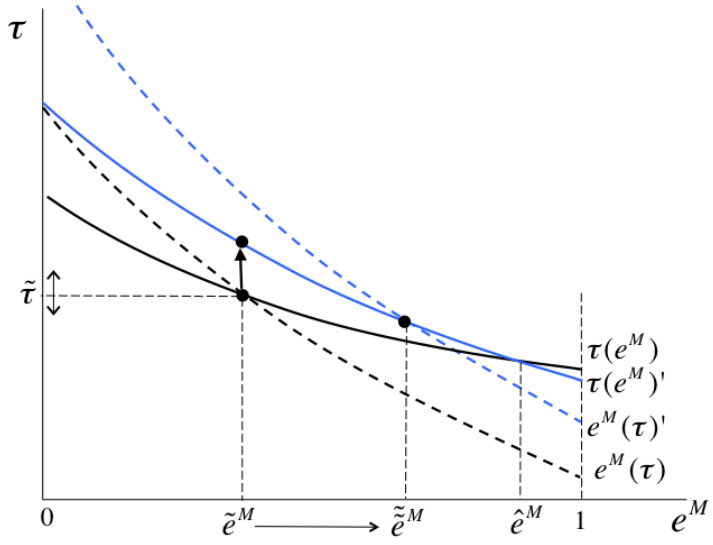


Figure 3: Steady State Response to $p^w \uparrow$

transition dynamics (which we term "policy overshooting") obtains, whether or not the new steady state tariff lies above or below the initial steady state value. Although in the figures drawn, the new steady state tariff lies slightly below the initial steady state level, this is by no means necessary to generate overshooting.

Figure 4 offers a depiction of the transition dynamics in $\{e_t, \tau_{t+1}\}$ space. First recall that the equilibrium tariff depends only on the *old* median voter's education level and current prices, and is therefore independent of expectations of future tariffs or prices. As such, the steady state tariff locus $\tau(e^M)'$, coincides with the out of steady state equilibrium tariff path of tariffs, which depends on the previous generation's education level and the contemporaneous terms of trade: $\tau_{t+1} = \tau(e_t^M; p^w)$. An immediate consequence is the convenient property that the new (post shock) steady state tariff locus pins down the equilibrium transition path. The rate at which the economy will proceed down the transition path depends on the (out of steady state) median voter education locus, which is described by $e_t^M = e^M(\bar{\tau}_t, \tau_{t+1})$, where in $\{e_t, \tau_{t+1}\}$ space the first argument is taken as given (and so acts as a shift parameter).

At the time of the unanticipated shock, which we take to occur in period $t = T$, the

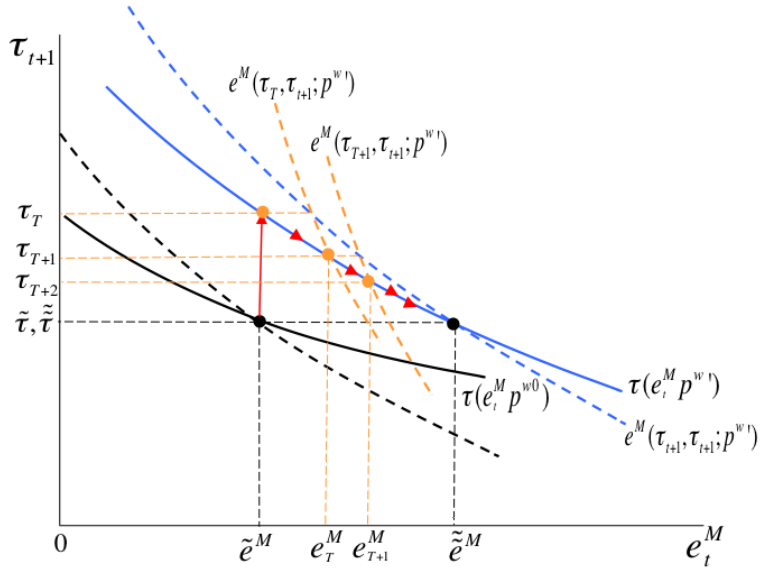


Figure 4: Transition Dynamics

time T median voter's education level is fixed at $e^M_{T-1} = \tilde{e}^M$, as the median voter chose her education level when young in period $T-1$, anticipating the initial steady state price to persist during her second period of life.[22] Given that her human capital is fixed in her second period of life, and because by assumption her (sunk) educational investment is sufficiently low to make her an import competing worker, the terms of trade shock will make her *more* protectionist than she would have been had the steady state continued. Consequently, the short-run democratic response to a terms of trade *improvement* is an immediate increase in the tariff at time T, represented by the point $(\tilde{e}^M, \tau_T)$ in Figure 4. The exact magnitude of the tariff increase at time T depends on the median voter's relative position $\Delta(a^M, \tilde{e}^M)$. The smaller the median voter's net position in the skilled sector relative to the "representative" agent in her generation, the more she will lose from the terms of trade shock, and therefore the greater her protectionist response to the terms of trade improvement. At the same time, we know from Lemma 3.2 that the tariff will not increase so much as to fully compensate the terms-of-trade shock, which implies that the domestic relative price of the skilled good

[22] Note that we could allow the stochastic shock to be anticipated, i.e. agents rationally expect the shock to happen with a given, low probability. This would not change the qualitative nature of our results.

still increases compared to the initial steady state, i.e. $p_T = p^{w\prime}/\tau_T > p_{T-1} = p^w/\tilde{\tau}$.

Given the the increase in the domestic relative price of the skill intensive good, we know from Lemma 2.1 that this increase would lead, ceteris paribus, to an increase in the educational investment of the young cohort born at time T relative to their predecessors. At the same time, the your agents' educational decisions also depend on the expected price in the following period, and thus τ_{t+1}. Thus, the out of steady state education locus at time T is given by $e^M(\tau_T, \tau_{T+1})$ where the first argument is already determined and the second is endogenous. We assume that these expectations are rational; that is, they coincide with the next period tariff that actually obtains as a result of the political process in the subsequent period. Since it is the median ability young agent at time T who is pivotal, her educational decision will in turn determine trade policy at time $T+1$.[23]

The leftmost out-of-steady-state education schedule in Figure 4 depicts the median's educational decision in period T. Note that this schedule is steeper than the (new) steady-state education schedule (denoted in the graph $e^M(\tau_{t+1}, \tau_{t+1}; p^{w\prime})$), as the former only takes into account the partial derivative with respect to expected future relative price, whereas the latter also features the dependence on the current relative price. Because the first argument of the out of steady state locus is held fixed at time T in the leftmost out-of-steady-state schedule, both schedules must intersect at τ_T as shown in the diagram. This intersection, however, cannot represent the educational decision of the median young in period T, as it implies an expected future relative price that then does not obtain, i.e. this is not consistent with rational expectations. The educational decision is instead given by the intersection of the leftmost out-of-steady-state education schedule with the new stead-state tariff locus which yields e_T^M and τ_{T+1}.

The same argument can be repeated for subsequent periods; that is, the intersection of the rightmost out-of-steady-state education schedule with the new steady-state tariff locus gives us (e_{T+1}^M, τ_{T+2}) and so forth, until we converge — along the steady-state tariff locus

[23]Note that under rational expectations, all agents must hold the same equilibrium beliefs about the future tariff; given the assortive matching of abilities to optimal education levels, we can thus conclude that in any equilibrium, all agents understand that the median ability voter will necessarily be the median voter with respect to trade policy in the subsequent period.

— to the new steady state with educational and tariff levels equal to $(\tilde{\tilde{e}}^M, \tilde{\tilde{\tau}})$.

We summarize these arguments in the following proposition:

Proposition 3.2. *An unanticipated, permanent terms of trade improvement in period T leads to:*

i) an immediate increase in the tariff at time T, from $\tilde{\tau}$ to τ_T;

ii) a subsequent monotonic decrease of τ_t for $t > T$ towards the new steady state tariff level; and

iii) a simultaneous, monotonic increase in e_t^M for $t \geq T$ towards the new steady state median voter education level.

Proof. tbw □

Several comments are in order. First, note the implication of the one-off increase in the tariff and its subsequent decrease towards the new steady state on the domestic relative price. This price jumps in period T (because the tariff is not fully compensating the terms of trade shock), and then slowly increases towards its new steady state level as the tariff comes down. This means that the politically chosen tariff serves to soften the impact of the terms-of-trade shock onto the domestic price over time. Second, the overshooting of the tariff is ultimately caused, similarly in spirit to the original exchange rate overshooting of Dornbusch (1976), by the difference in adjustment speeds. While the economic structure that takes the form of the educational decision of the previous generation in our framework, can adjust only with a time lag of one generation, the policy response is taken to be enacted in the same period. This is reminiscent of the difference in price stickiness between financial and non-financial prices in Dornbusch (1976).

We can map this change in tariffs over time in the following figure, which illustrates the time path of the tariff response to the increase in p^w. Recall that the new steady state tariff level may be higher or lower than the original steady state – but in either case, we have demonstrated the potential for policy overshooting: an immediate surge in protectionism

following an exogenous terms to trade shock, followed by a gradual decline in tariffs as the new steady state tariff level is reached.

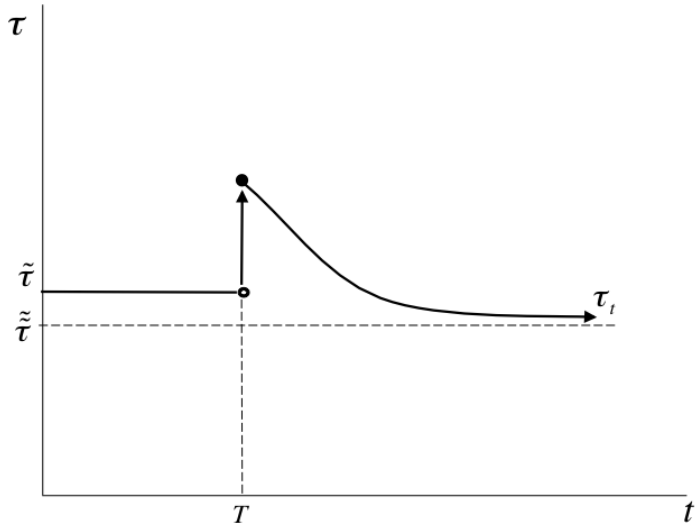


Figure 5: Time Path of Tariff Response to $p^w \uparrow$

It is noteworthy that this dynamic trade policy response, which is characterized by a dramatic jump in tariffs, is in practice acting as a shock absorber for the overall economy. The sudden, sharp political response to the increase in world prices tempers the effect of the shock on local prices – in effect, giving the country's constituents time to adjust gradually to the new macroeconomic conditions. The following time path for the local price adjustment demonstrates.

Viewed through the lens of prices, protectionist overshooting takes on an apparently more innocuous role as an economic shock absorber. So is policy overshooting innocuous? In short, 'no'. policy overshooting slows adjustment over time, and thus entails real efficiency losses. The economy would be better off over all if it immediately shifted to the new steady state at time T, simply compensating the time $T-1$ generation – the voters that were caught unaware by the exogenous shock – for their losses. Short of such a dramatic (and politically infeasible (who is to say what, truly, is an unanticipatable shock?)) transfer scheme, effective and efficiency improving public policy would reduce the adjustment costs

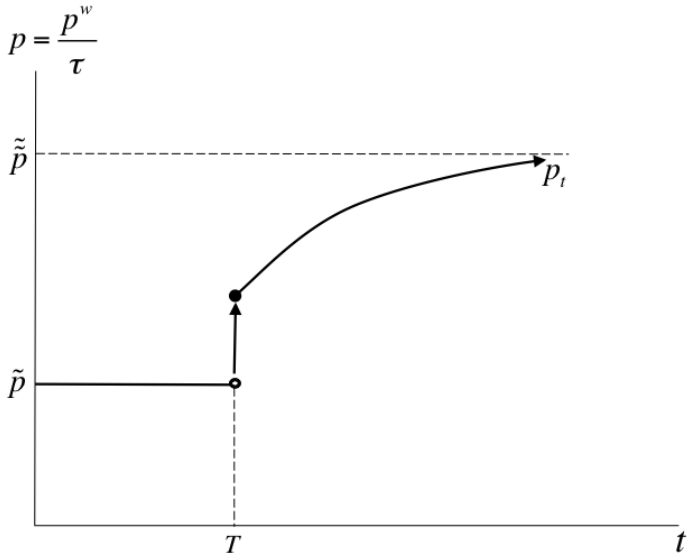


Figure 6: Time Path of Local Price Response to $p^w \uparrow$

and time lags inherent in the system.

In the simple model above, individuals are completely unable (or rather, have no incentive) to adjust their human capital levels in the second period of life. If instead older agents were able to increase education levels with relative ease, transition to the new steady state would be faster and thus more efficient.

4 A Brief Look at Data

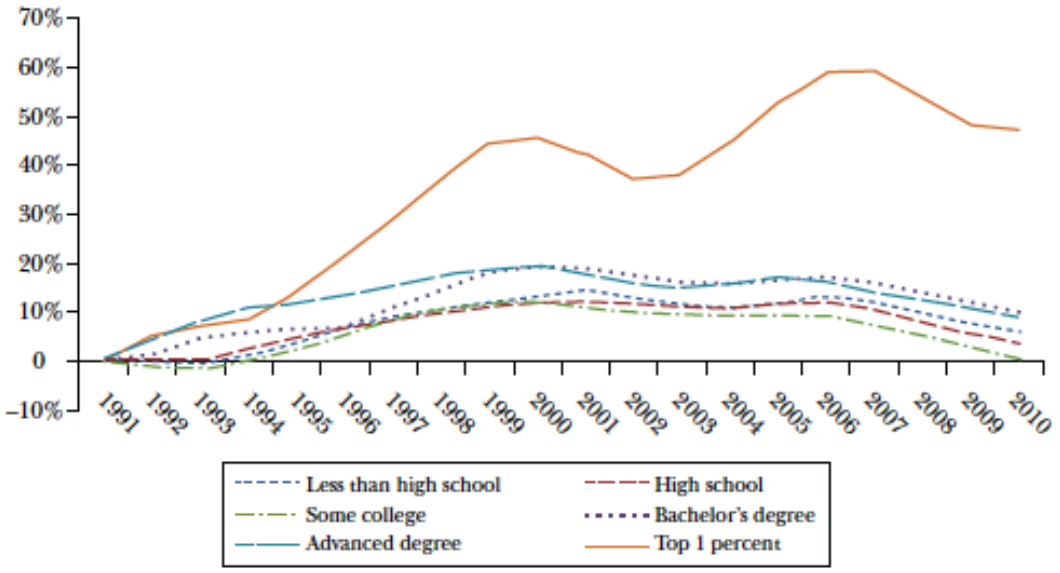
Having developed a basic model of policy overshooting, we highlight three basic insights that can be taken to data.

First, heterogeneity among individuals' in the distribution of gains and losses from terms of trade changes will be reflected in their trade policy preferences. Thus, it is not economic or income equality that matters for trade policy preferences, per se, but how voters differ in their individual level terms of trade. Likewise, it is individual-specific terms of trade that drive trade policy responses to exogenous shocks. If all workers were identical,

then the median voter would also be the representative voter, and would perfectly represent the policy preferences of the electorate as a whole. (In this small open economy, then, the equilibrium tariff would be zero.) It is the fact that the median voter differs from the representative voter that matters in for her most preferred tariff policy. And that difference can be further distilled to her individual level terms of trade embodied in $\Delta(a)$: if the median voter is a greater net producer of the unskilled good than the average voter, then her individual level bias will drive her both toward higher tariffs in steady state, and greater protectionist reactions to aggregate terms of trade changes.

Looking at the median education level in the U.S. from the most recent data from the U.S. Census, it is fairly clear that the median voter in the U.S. is in direct competition with lower skill imports from abroad. Over the past ten years, the real wage of this median income group has been falling steadily. With permission, we have replicated the following figure from Haskel, Lawrence, and Slaughter (2012). The median education level in the U.S. is approximately one year of post secondary education, which falls in the "Some College" category below – the group that has experienced both the lowest real income growth since 1991 (zero), and the steepest decline since 2000.

Changes in U.S. Real Income, Working Adults, by Education and for Top 1 Percent

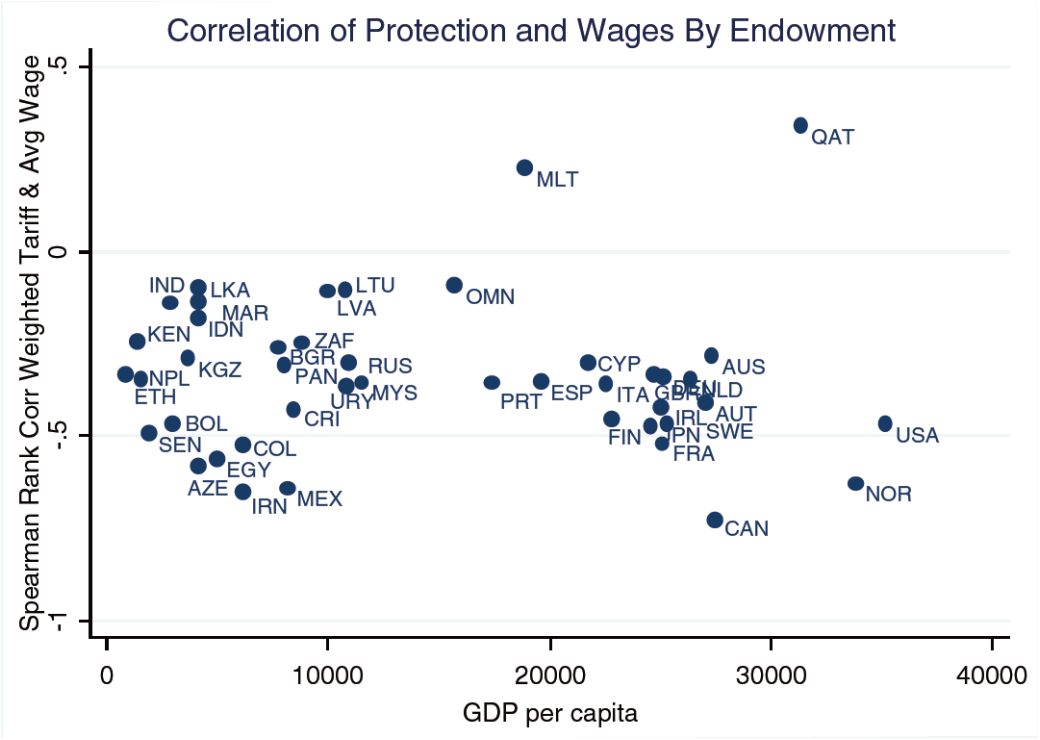


Source: US Census via Haskel, Lawrence, Slaughter *JEP* 2012

Second, an important caveat is that our model assumes a structure in which the ex-ante distribution of voters' policy preferences corresponds to their ex-post policy preferences. But what matters most vis a vis the dynamic political response to shocks is in workers' differential *exposure* to the shock itself. So, for example, if the workers most adversely affected by the terms of trade shock are not necessarily the most protectionist ex-ante, then the very identity of the median voter may change with the shock. Our model adopts a simple structure so that we can align workers along a single dimension – inherent ability, a, that corresponds to education, income, and individual trade policy bias embodied in $\Delta(a)$ – the last of which directly translates to shock vulnerability. A richer model would allow the greatest 'losers' from trade to be in the middle of the distribution (a closer reflection of evidence in much of the industrialized world) as in Blanchard and Willmann (2008), but at the cost of tractability in a dynamic setting.

Finally, it is worth making the rather obvious point that political enfranchisement matters. To the extent that the majority of lower-ability, import-competing voters are politically disenfranchised, then of course the policy rule would look very different. If equilibrium policy is determined instead by a higher-ability decisive voter – particularly one whose level bias, $\Delta(a)$ reflects the country's aggregate terms of trade – then policy overshooting will not result. Quite the contrary if $\Delta(a) > 0$, the immediate policy response to an increase in p^w would be a sharp drop in the tariff, followed by subsequent reductions in the tariff thereafter, as the economy converges to the new steady state. (Graphically, the $\tau(e^M)$ locus would shift *down* at $\tilde{e}^M$ following an increase in the country's terms of trade; the new steady state tariff level would be unambiguously lower (and the education level higher) as a result.)

Is the median voter politically disenfranchised in practice? Perhaps, but probably not completely. Recent work by Lu, Scheve, and Slaughter (2012) reveals the widespread practice of offering differentially higher protection to lower-skill workers in virtually every country. Figure 4 plots the Spearman rank correlation between average wages and (trade weighted) average tariff protection across 28 manufacturing sectors around 2001 for a broad set of countries. The remarkably consistent negative correlation coefficients suggest that



Source: Lu, Scheve, Slaughter *AJPS* 2012

virtually all countries – regardless of underlying (aggregate) comparative advantage – offer more protection to their lower wage workers.

To summarize: we most expect to see policy overshooting in response to an aggregate terms of trade improvement when the gains from openness accrue disproportionately to the top of the ability/skill distribution, and when trade policy is determined by popular vote. In a sense, then, radical policy reactions to exogenous shocks may reflect both an unhealthy pattern in the underlying distribution of the gains from globalization, but a health democracy.

5 Concluding Remarks

We use a simple, generalizable model to highlight the practical importance of adjustment costs in shaping political responses to macroeconomic shocks. Because policy adjustment is virtually immediate, while real adjustment is both slow and costly, it is obvious and natural

that policy can serve as an economy's 'shock absorber.' But in a democracy, whether and to what extent the buffer mechanism is used depends both on the distributional consequences of the shock in question and the extent of political enfranchisement. When the majority suffer the short run consequences of a macroeconomic shock, as often appears to be the case, populist pressure demands that the the buffer be used. As long as the majority vote, policy will react, potentially sharply, leading to distortionary policy overshooting and a prolonged, painful adjustment process to the new steady state. If, however, those who are most hurt by the shock are also politically disenfranchised, voting outcomes may not reflect majority preferences, and the shock absorber may be left unused. In that sense, policy overshooting may signal simultaneously healthy democracy and widespread economic losses in the case of a negative macroeconomic shock, such as a recession or exogenous deterioration in the majority's terms of trade.

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