

Sustaining Imperfectly Credible Trade Liberalization:
Do the Rate of Tariff Reduction and the
Degree of Labor Mobility Matter?

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Draft Date: June 15, 2005

Abstract

Imperfectly credible trade liberalization can lead to balance of payment deterioration and a subsequent reversal of the reform. Therefore, this paper examines whether the likelihood of policy reversal depends on the rate of tariff reduction or the degree of labor mobility. The analysis shows that transitory unemployment increases the likelihood of policy reversal. Furthermore, a gradual reduction in the tariff rate is found to extend the life of the liberalization episode, but does not necessarily increase the likelihood of sustained liberalization.

Keywords: Liberalization; Credibility; Gradual; Unemployment; Payments
Deficits

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1. Introduction

Policies that lack credibility can have unintended and harmful consequences. Thus, the issue of credibility has been given consideration throughout the literature. With regards to trade liberalization though, studies on the impact of imperfect credibility fall into two categories. In the first category, papers emphasize that imperfectly credible trade liberalization distorts intertemporal choice. In Calvo (1987), (1988), and (1989), consumers reduce savings through capital inflows in response to an expected reversal of the trade liberalization. Likewise, in Rodrik (1989b), the expectation of a policy reversal prompts consumers to reduce savings, which, given a closed capital account, produces a higher interest rate and lower investment. Papers in the second category find that imperfect credibility increases the current account deficit and can cause the trade liberalization to be aborted. In both Froot (1988) and Buffie (1995), expectations of future tariffs induce an import binge by consumers. If the import binges reduce foreign exchange reserves to some critical level, the government is forced to reverse the trade liberalization.

Given the consequences of imperfectly credible trade liberalization, two questions arise. First, under what conditions are these trade liberalizations likely to be reversed? Second, can the liberalization policy be designed in such a way so as to reduce the risk of policy reversal? Addressing the first question, Buffie (1995) finds that the sustainability of imperfectly credible trade liberalization depends on the size of the government's foreign exchange reserve cushion and on the size of the intertemporal elasticity of substitution relative to the real income

gains from liberalization. However, Buffie (1995) assumes full employment holds throughout the liberalization episode. This may be a strong assumption since imperfect credibility can undermine trade liberalization through the labor market. More specifically, when trade liberalization lacks credibility, not only would consumers binge on imports, but also labor released from the import-competing sector might not choose to seek employment in the export sector. As a result, the decrease in production in the import-competing sector would not be completely offset by increased production in the export sector. Thus, as Rodrik (1989a) contends, efficiency gains from liberalization may not be realized under imperfect credibility.

Even if a country's economic characteristics are not conducive to sustained trade liberalization, liberalization policies can potentially be designed to reduce the risk of policy reversal. Indeed, economists have speculated about the appropriate design of trade liberalization policy. Most notably, economists such as Dornbusch (1992) and Takacs (1990) have asserted that gradual trade liberalization can reduce balance of payments problems, which would increase the likelihood of sustained liberalization.

Research on the impact of gradual trade liberalization is not unprecedented. Rodrik (1989b) focuses on the political economy aspects of trade liberalization and finds that the speed of liberalization signals government commitment to maintaining the liberalization. Other papers, including Mussa (1986), Albuquerque and Rebelo (1998), and Mehlum (1998), determine that gradualism can reduce income distribution shifts or unemployment that would

occur under instantaneous liberalization. Moreover, Edwards and van Wijnbergen (1986) demonstrate that gradual tariff reduction produces higher welfare than instantaneous liberalization when external financing constraints fall disproportionately on investment, which is typical of developing countries.

Nonetheless, research on the impact of gradualism on the balance of payments is virtually absent from the body of literature on trade liberalization, despite the conventional wisdom that gradualism can reduce balance of payments problems. In fact, only Froot (1988) formally demonstrates a link between the rate of tariff reduction and the balance of payments. More specifically, Froot (1988) finds that not only does gradualism produce a lower current account deficit than does instantaneous trade liberalization, but it also increases the likelihood that the liberalization will be sustained.

With a different structure though, I will attempt to make the relationship between gradualism, the balance of payments, and the sustainability of the reform more transparent and more indicative of a developing economy than in Froot (1988). Accordingly, the following infinite-horizon analysis differs from Froot's two-period model in that it is deterministic, has money as an asset, and allows for large tariffs and income effects. First, the deterministic approach makes clear the connection between the imperfectly credible policy and the current account deficit because the current account deficit is not hit by random shocks as it is in Froot's model. Second, with money as an asset, the relationship between the private sector's behavior following trade liberalization and the resulting current account deficits can be viewed simply and transparently. Third, by allowing for

large tariffs and income effects, the impact of trade liberalization in developing countries can be more accurately understood since pre-liberalization tariffs in these countries are often greater than 50 percent.

Moreover, an infinite-horizon framework is better equipped to analyze the dynamics of gradualism. In Froot's two-period model, consumers binge on imports when they expect reversal of the trade liberalization. Gradualism is introduced into the model in the form of a small first-period tariff in order to counter the impact of the speculative import purchases. More specifically, the first-period tariff would prompt consumers to spend less than they would if there were no first-period tariff, reducing the pressure on the current account. From such a model, one concludes that gradualism decreases the likelihood of a balance of payments crisis and, thus, increases the likelihood of sustained liberalization. In an infinite-horizon model, however, a time will come under gradual liberalization where the representative agent faces virtually the same tariff rate and, thus, the same incentives to binge on import goods as under instantaneous liberalization. Thus, in an infinite-horizon framework, gradualism extends the duration of the liberalization episode, but may not increase the likelihood of sustained liberalization. Consequently, the impact of gradualism is not as obvious as the two-period model would lead one to believe. Taken together, the differences in this paper's model from Froot's allow for more quantitative results and better understanding of the impact of gradualism on the likelihood of sustained trade liberalization.

Fundamentally, this paper builds on the model developed in Buffie (1995) by extending it in two important ways – by allowing for gradual liberalization and for transitory unemployment. Two reasons drive the choice to include transitory unemployment. First, as noted in Harrison and Hanson (1999), economists know very little about the short-run impact of trade liberalization on unemployment. Even less is known about the short-run impact of imperfectly credible trade liberalization on unemployment. Thus, the possibility of transitory unemployment being a byproduct of trade liberalization should not be disregarded in an analysis on the sustainability of imperfectly credible trade liberalization. Second, research is also lacking on the impact of transitory unemployment on the sustainability of trade liberalization. The World Bank study by Papageorgiou, Michaely, and Choksi (1991) is a notable exception. However, the study excludes trade liberalizations that are reversed in less than two years. Thus, their data is likely to be biased against transitory unemployment affecting the sustainability of the trade liberalization, particularly in light of section 7 in this paper, which demonstrates that trade liberalizations incurring transitory unemployment will likely be reversed in less than a year.

In summary, this paper will extend the literature by examining how the degree of labor mobility following imperfectly credible trade liberalization impacts the sustainability of the liberalization. Furthermore, with the sustainability of the trade liberalization at stake, appropriate design of the liberalization policy becomes an issue. Thus, this paper will also examine whether the rate of tariff reduction impacts the liberalization's sustainability.

More specifically, this paper examines whether a slower liberalization rate reduces the pressure on the current account deficit and increases the likelihood that the trade reform will be sustained when the public believes it will be reversed.

The need for such research is best illustrated by the experiences of countries that have tried to liberalize trade. According to several studies, at least fifty percent of trade liberalizations are reversed.¹ Often these reversals follow balance of payments crises. As noted in Papageorgiou, Michaely, and Choksi (1991: 141), "episodes of liberalization in which foreign exchange reserves keep rising, or at least do not fall, are most likely to be fully sustainable, whereas policy reversal is almost bound to follow a falling trend of reserves." Moreover, the liberalization attempts that do result in balance of payments crises are often believed to lack credibility. If the private sector expects the liberalization to be reversed, they will stock up on imports while the tariff is low, which in turn reduces the central bank's foreign exchange reserves. The experiences of many developing countries, ranging from Kenya (1978 and 1980) to Mexico (1988), support the link between imperfectly credible trade policy and depletion of foreign exchange reserves.² Therefore, if research can show that gradually reducing the tariff rate decreases balance of payments pressure and thus increases the likelihood that imperfectly credible trade reform is sustained, then perhaps future liberalization attempts will not succumb to the same fate as previous attempts.

The paper is organized into eleven sections. After describing the model in section 2, the foreign exchange reserves losses under both perfectly and imperfectly credible liberalization are derived in sections 3 and 4. Then, the model is calibrated in section 5. The subsequent four sections provide analysis on the impact of transitory unemployment and the rate of tariff reduction on the sustainability of imperfectly credible trade liberalization. Transitory unemployment, resulting from the trade liberalization's lack of credibility, is shown to increase the likelihood of cumulative payments deficit and thus, decrease the likelihood of sustained liberalization. Furthermore, gradualism is shown to extend the duration of the liberalization episode when full employment is maintained and when the trade policy's lack of credibility leads to transitory unemployment. However, gradual tariff reduction appears to have no impact on the sustainability of trade liberalization for a standard infinite-horizon model. In section 10, the model is modified to include foreign bonds as an asset in order to examine the impact of transitory unemployment and the speed of liberalization under an open capital account. Unfortunately, transitory unemployment is found to decrease the likelihood of sustained liberalization here as well. Under certain circumstances though, gradualism is found to increase the likelihood of sustained liberalization. Section 11 concludes.

2. The model

To examine how the rate of tariff reduction and the degree of labor mobility affect the sustainability of the trade reform, I develop a competitive,

two-sector general equilibrium model of a small economy with a closed capital account and one financial asset, money. In this model, a representative agent produces and consumes an export good and an import good. The export good is not taxed. Thus for simplicity, the price of the export good will be suppressed in the functions below. However, the import good is subject to a tariff h . Therefore, the domestic price for the import good is $P_m = 1 + h$, given that world prices are set to unity.

2.1. Production and employment

Domestic output is produced according to $Q_s \equiv F(L_s, K_s)$, where L_s and K_s are the labor employment and capital stock in sector s , respectively. K_s is assumed to be constant since the model is examining adjustment problems in the short and medium runs. Assuming perfect competition and cost minimization, the sectoral labor demands are

$$\hat{L}_m = -\frac{\sigma_m}{\theta_K^m} (\hat{w} - \hat{P}_m),$$

$$\hat{L}_x = -\frac{\sigma_x}{\theta_K^x} \hat{w},$$

where σ_s is the elasticity of substitution between labor and capital in sector s , θ_j^s is the cost share of resource j in the production of good s , and a circumflex denotes the percentage change in a variable.

If the trade policy is credible or if the trade policy lacks credibility, but the lack of credibility does not affect labor decisions, wages will adjust to maintain full employment. Consequently,

$$\hat{L}_m = \Gamma \hat{P}_m, \quad (1)$$

where

$$\Gamma \equiv \frac{(1-\alpha)\sigma_m\sigma_x\theta_L^x}{\alpha\sigma_m\theta_L^m\theta_K^x + (1-\alpha)\sigma_x\theta_L^x\theta_K^m},$$

$\alpha \equiv P_m Q_m / R(P_m, L_m)$ denotes the production share of the import-competing good, and $R(\cdot)$ is the economy's revenue or GDP function.

Alternatively, if labor released from the import-competing sector expects a policy reversal that would return her to that sector in the near future, she may choose to remain unemployed rather than seek employment in the export sector, particularly when adjustment costs are high. If labor does not reallocate to the export sector because of the expectation of policy reversal, wages do not fall. Thus, to model the case where transitory unemployment arises as a result of imperfectly credible policy, wages are assumed to be inflexible in the downward direction. In such a case, the change in employment in the import-competing sector would be represented by

$$\hat{L}_m = \frac{\sigma_m}{\theta_K^m} \hat{P}_m. \quad (2)$$

Thus, equations (1) and (2) characterize the polar cases where imperfectly credible liberalization results in either complete or no reallocation of the labor released from the import-competing sector to the export sector.

2.2. The representative agent's optimization problem

The infinitely lived representative agent receives utility from consumption of the import good and the export good and from non-pecuniary services yielded by real money balances, M / P_m^γ , where γ is the consumption share of the importable good. Thus, the agent's problem is to choose nominal expenditures, E , and savings, S , to maximize

$$\int_0^{\infty} \left[V(P_m, E) + \phi\left(M / P_m^\gamma\right) \right] e^{-\rho t} dt, \quad (3)$$

subject to

$$E + S = R(P_m, L_m) + h\left[D(P_m, E) - Q_m\right], \quad (4)$$

$$\dot{M} = S, \quad (5)$$

where ρ is the fixed time preference rate. The indirect utility function, $V(\cdot)$, and $\phi(\cdot)$ are both increasing and strictly concave. Equation (4) gives the budget constraint, where the derivatives of the revenue function, $R(\cdot)$, are $R_1 = Q_m$, $R_2 = w_m$ in the unemployment case, and $R_2 = 0$ in the full employment case. Also, equation (4) shows that tariff revenues, $h\left[D(P_m, E) - Q_m\right]$, are rebated in lump sum to the public, where the import volume is the difference between the Marshallian demand function for the import good, $D(P_m, E)$, and the domestic production of the import good, Q_m . Furthermore, equation (5) states that the accumulation of nominal money balances, M , is the only way to increase savings. Therefore, the representative agent's optimization problem is essentially the same

as the one in Buffie (1995) except that here the revenue function allows for unemployment.

2.3. Gradual liberalization

At time $t = 0$, the government implements a trade reform policy in which the tariff h will be reduced to a target level h^* according to the policy rule

$$\dot{h} = k(h^* - h), \quad k > 0, \quad (6)$$

where k is a parameter and an overdot denotes a time derivate. Under a strict interpretation of equation (6), the target tariff level will not be reached in finite time when the tariff rate is reduced gradually. However, the parameter k can be chosen such that the tariff rate is arbitrarily close to the target level in a specified number of years after the liberalization is initiated.

2.4. The transition path

The solution to the private agent's optimization problem provides the following first order conditions:

$$\pi = V_E(P_m, E), \quad (7)$$

$$\dot{\pi} = \rho V_E(P_m, E) - \phi'(M / P_m^\gamma) / P_m^\gamma, \quad (8)$$

where π is the multiplier associated with (4). Substituting (8) into the time derivative of (7) gives

$$V_{EE}\dot{E} + V_{EP}\dot{h} = \rho V_E(P_m, E) - \phi'(M / P_m^\gamma) / P_m^\gamma. \quad (9)$$

From (9), the differential equation for savings can be found. Working toward this end, totally differentiate the budget constraint and substitute for L_m from equations (1) and (2). This yields

$$dE = D(1-b_i)dh - g^{-1}dS, \quad i=1, 2, \quad (10)$$

where

$$b_1 \equiv h \left[\varepsilon + \theta_L^m \Gamma (1 - Z/D) \right] / (1 + hc_x), \quad (\text{full employment})$$

$$b_2 \equiv \left[h\varepsilon - \sigma_m \theta_L^m (1 - Z/D) / \theta_K^m \right] / (1 + hc_x), \quad (\text{transitory unemployment})$$

$$g \equiv (1 + hc_x) / (1 + h),$$

and b_1, b_2 represent the cases where imperfectly credible trade liberalization is followed by full employment and transitory unemployment, respectively. Also, ε is the compensated price elasticity of demand for the importable good, while c_x denotes the marginal propensity to consume the export good. Since ordinary derivatives become time derivatives along the transition path, the derivatives in (10) can be converted to time derivatives and substituted with the policy rule into (9) to produce

$$-g^{-1}V_{EE} \dot{S} = \rho V_E - \frac{\phi'(M/P_m^\gamma)}{P_m^\gamma} - k(h^* - h) [D(1-b_i)V_{EE} + V_{EP}]. \quad (11)$$

Linearization of (5) and (11) around the new steady state where $S = 0$, $M = M^*$, and $h = h^*$, along with the policy rule, gives the economy's dynamics. To better understand these dynamics, utilize both the formula for the income elasticity of money demand, δ , given by the steady state relationship $\rho P_m^\gamma V_E(P_m, E) = \phi'(M/P_m^\gamma)$ and Roy's identity, $D = -V_P/V_E$. Under

homothetic preferences, differentiation of Roy's Identity with respect to E implies $\tau = 1 + V_{PE} / V_{EE} D$, where $\tau \equiv -V_E / V_{EE} E$, the intertemporal elasticity of substitution. Given these results, the economy's dynamics can be written as

$$\begin{bmatrix} \dot{S} \\ \dot{M} \\ \dot{h} \end{bmatrix} = \begin{bmatrix} \rho & \rho g / \mu \delta & -g D \Delta \\ 1 & 0 & 0 \\ 0 & 0 & -k \end{bmatrix} \begin{bmatrix} S \\ M - M^* \\ h - h^* \end{bmatrix}, \quad (12)$$

where $\mu = M/E$, $\delta \equiv \hat{M} / \hat{E} = \rho V_{EE} E P^{2\gamma} / \phi'' M$, and $\Delta \equiv \rho(\delta^{-1} - b_i) + k(\tau - b_i)$.

3. Perfectly credible liberalization

Given that across steady states, savings is zero and labor is fully employed, equation (10) provides the real income gain resulting from perfectly credible trade liberalization:

$$\hat{E} - \gamma \hat{P}_m = -b_1 \hat{P}_m. \quad (13)$$

Since b_1 is positive, then the real income gain from trade liberalization is also positive.

Setting the income elasticity of money demand to the accepted value of unity, equation (13) and the total derivative of the steady state condition, $\rho V_E(P_m, E) = \phi'(M / P_m^\gamma) / P_m^\gamma$, yield the long run change in money balances:

$$f_1 \equiv \hat{M} / \hat{P}_m = \gamma(1 - b_1), \quad (14)$$

where f_1 denotes long-run elasticity of reserves with respect to P_m , under the simplifying assumption that the money supply equals the amount of foreign

exchange reserves. Accordingly, equation (14) also measures the cumulative payments surplus.

As equation (14) demonstrates, a tariff reduction affects the cumulative balance of payments in two important ways, namely by changing the price level and real income. First, a tariff reduction lowers the price level, which in turn, lowers the demand for nominal money balances. Second, the real income gain associated with the trade liberalization raises the demand for real money balances.

The impact on the cumulative balance of payments of reducing the price level will likely dominate the opposing real income effect. Thus, tariff reduction that is perceived by the public as being credible will likely lead to a cumulative payments deficit. For example, the long-run elasticity of reserves with respect to P_m is approximately 0.21 when parameters take the following values: $h = 0.45$, $\gamma = 0.25$, $\sigma_m = \sigma_x = 1$, $\varepsilon = \alpha = Z / D = 0.2$, $\theta_L^m = 0.30$, and $\theta_L^x = 0.45$.^{3,4}

The results for the long run here are the same as those found in Buffie (1995). Not surprisingly, gradual tariff reduction does not affect the level of foreign exchange reserves needed to sustain a perfectly credible trade liberalization. In the following sections, I will examine whether or not this result also holds when trade liberalization lacks credibility.

4. Imperfectly credible liberalization

If the tariff reduction is perceived by the private sector as being temporary, the economy may not converge to the long-run equilibrium associated

with the lower tariff. Instead, the economy may follow a path consistent with the expectation that the trade reform will be reversed at some time t_1 . If this path leads to losses in foreign exchange reserves greater than what the government is willing or able to sustain, then the government would be forced to reverse the trade liberalization. In such a case, self-fulfilling failure (SFF hereafter) is an equilibrium. To determine if the economy can, in fact, converge to a SFF equilibrium, the transition path for an economy following temporary trade liberalization is analyzed.⁵

With temporary liberalization, the economy follows a non-convergent path while the tariff is lower. More specifically, if the private sector expects the reform to be reversed at some time t_1 , S , M , and h evolve over the period $(0, t_1)$ according to

$$S(t) = \lambda_1 q_1 e^{\lambda_1 t} + \lambda_2 q_2 e^{\lambda_2 t} + \lambda_3 \Omega q_3 e^{\lambda_3 t}, \quad t \leq t_1, \quad (15)$$

$$M(t) - M^* = q_1 e^{\lambda_1 t} + q_2 e^{\lambda_2 t} + \Omega q_3 e^{\lambda_3 t}, \quad t \leq t_1, \quad (16)$$

$$h(t) - h^* = q_3 e^{\lambda_3 t}, \quad t \leq t_1, \quad (17)$$

where

$$\lambda_1, \lambda_2 = \left(\rho \pm \sqrt{\rho^2 + 4\rho g / \mu \delta} \right) / 2, \quad \lambda_1 > 0, \lambda_2 < 0,$$

$$\lambda_3 = -k,$$

$$\Omega \equiv \Delta / [(\rho - \lambda_3) \lambda_3 + \rho g / \mu \delta],$$

q_1 , q_2 , and q_3 are constants determined from the initial conditions, λ_1 , λ_2 , and λ_3 are eigenvalues, and M and h are predetermined variables.

At time t_1 , the tariff immediately returns to its initial level. Thus, from t_1 onward, savings and nominal money balances follow a saddlepath back to the pre-liberalization equilibrium, namely

$$S(t) = \lambda_2 y e^{\lambda_2 t}, \quad t \geq t_1, \quad (18)$$

$$M(t) - M_0 = y e^{\lambda_2 t}, \quad t \geq t_1, \quad (19)$$

where y is a constant determined from the initial conditions, and M_0 is the initial nominal money balances.

From equations (15) through (19), the loss in foreign exchange reserves resulting from temporary liberalization can be ascertained. Toward this end, solutions for the constants q_1, q_2, q_3 , and y are derived in the appendix. With the solutions for the constants, the path of nominal money balances is found to be

$$\begin{aligned} & \frac{[M(t) - M_0]/M_0}{\hat{P}_m} \\ &= f_i (1 - e^{\lambda_2 t}) + \frac{\Omega(1+h)(1-\nu)}{M_0} (e^{\lambda_2 t} - e^{\lambda_3 t}) \\ &+ \frac{f_i M_0 \lambda_2 + J_i [1 - (1-\nu)e^{\lambda_3 t_1}] + \Omega(1+h)(1-\nu)(\lambda_3 - \lambda_2) e^{\lambda_3 t_1}}{M_0 (\lambda_1 - \lambda_2)} \\ &\times [e^{\lambda_1(t-t_1)} - e^{\lambda_2 t - \lambda_1 t_1}], \quad t \leq t_1. \end{aligned} \quad (20)$$

Because the government cannot sustain large losses in foreign exchange reserves, it will immediately return to the pre-liberalization tariff rate if total reserve losses are Ψ , where $\Psi \equiv [(M - M_0)/M_0]/\hat{P}_m$.⁶ Thus, at t_1 , the time when the trade liberalization is reversed, Ψ equals the reserve loss in (20). In other words,

$$\begin{aligned}
\Psi - f_1 = & \gamma(b_1 - b_i) + f_i \left\{ \frac{\lambda_2}{\lambda_1 - \lambda_2} [1 - e^{(\lambda_2 - \lambda_1)t_1}] - e^{\lambda_2 t_1} \right\} \\
& + \frac{J_i [1 - (1 - \nu) e^{-kt_1}]}{M_0 (\lambda_1 - \lambda_2)} [1 - e^{(\lambda_2 - \lambda_1)t_1}] \\
& + \frac{\Omega(1 + h)(1 - \nu)}{M_0} \left\{ \frac{-k - \lambda_2}{\lambda_1 - \lambda_2} [1 - e^{(\lambda_2 - \lambda_1)t_1}] e^{-kt_1} + e^{\lambda_2 t_1} - e^{-kt_1} \right\}, \quad i = 1, 2.
\end{aligned} \tag{21}$$

In addition, Ψ is assumed to be at least as large as f_1 , which guarantees that perfectly credible trade reform is sustainable. However, this condition is not sufficient to ensure that imperfectly credible reform is sustainable, though. Indeed, self-fulfilling failure is an equilibrium if (21) holds as an equality for some positive value of t_1 .

The solution equation (21) differs from that in Buffie (1995) in that it allows for transitory unemployment and varying rates of tariff reduction. Thus, to see if these generalizations add insight on how best to liberalize trade in developing economies, it is worthwhile to examine the impact of each of them separately on equation (21) and then together. Toward this end, parameter values typical of developing economies are chosen in the next section. Then, the impact of transitory unemployment and gradualism are examined in sections 6, 7, 8, and 9.

5. Model calibration

In order to understand how gradualism and transitory unemployment impact the sustainability of imperfectly credible trade liberalizations, parameters in the model are specified in accordance with available real-world data, empirical

evidence, and theory. In particular, the time preference rate, the income elasticity of money demand, and the ratio of money balances to national income are set at the accepted values of 0.05, 1, and 0.1, respectively. The values for the consumption share of the importable good ($\gamma = 0.25$) and the share of importable goods purchased from abroad ($Z/D = 0.2$) reflect the import substitution structure of many developing economies prior to trade liberalization. With regard to the compensated elasticity of demand for the importable good, ε , a value of 0.2 is chosen to be consistent with demand studies such as Blundell (1988) and Deaton and Muellbauer (1980). A value of 2 is also chosen for ε to capture the impact of trade liberalization when large efficiency gains result. Furthermore, the literature does not provide clear guidance as to the exact values for the intertemporal elasticity of substitution, τ . Accordingly, τ will be allowed to vary from 0.1 to 2.⁷

Concerning the production parameters, cross-sectional studies have found the elasticity of substitution between capital and labor, σ_s , to be around unity, while time series studies have found it to be closer to 0.5.⁸ Given the results of the cross-sectional studies, the elasticity of substitutions for both the import-competing sector and the export sector are set at unity. Moreover, the cost share of labor in the import-competing sector, θ_L^m , and the export sector, θ_L^x , will be set at 0.3 and 0.45, respectively, as the import-competing sector in developing countries tends to be more capital intensive.⁹ Finally, the production share of the import-competing good, α , is set at 0.2, given that manufacturing value added as

a percent of GDP for low-income countries, excluding China and India, and for middle-income countries is 18% and 21%, respectively (World Bank, 2000: 253).

The other factors that can impact the sustainability of the trade liberalization include the pre-liberalization tariff rate, the foreign reserve cushion, and the rate of tariff reduction. Based on a 1994 World Bank study by Dean, Desai, and Riedel, the pre-liberalization tariff rate, h , is set to 45%. Moreover, Ψ will be allowed to vary from f_1 to 2, which means that the government's reserve cushion ranges from the amount needed to sustain perfectly credible trade liberalization to more than eight times the reserves needed to sustain perfectly credible liberalization. With regards to the rate of tariff reduction, k , the selected values are 0.46 and 2.3. A government that is eliminating tariffs at a 0.46 rate of tariff reduction will find that after five year of liberalization, the tariff rate is 10% of its original level. If the government chooses $k = 2.3$, though, the tariff rate will be 10% of its original level in one year after the trade liberalization is initiated.

Given these parameter values and equation (21), both qualitative and quantitative results of the impact of transitory unemployment and the rate of tariff reduction on the sustainability of imperfectly credible liberalization are derived in the following sections.

6. Instantaneous liberalization with full employment

Before examining the impact of transitory unemployment and gradualism on the sustainability of imperfectly credible trade liberalization, it is worthwhile to know what factors affect the liberalization's sustainability in the special case

of Buffie (1995): instantaneous tariff reduction where full employment is maintained throughout the liberalization episode. Working toward this end, solution (21) becomes

$$\Psi - f_1 = f_1 \underbrace{\left\{ \frac{\lambda_2}{\lambda_1 - \lambda_2} [1 - e^{(\lambda_2 - \lambda_1)t_1}] - e^{\lambda_2 t_1} \right\}}_{-} + \frac{J_1}{M_0} \underbrace{\left[\frac{1 - e^{(\lambda_2 - \lambda_1)t_1}}{\lambda_1 - \lambda_2} \right]}_{+} \quad (22)$$

when v is set to unity and full employment is assumed. To illustrate the dual equilibria that can arise, Figure 1 provides the path of foreign exchange reserve following trade liberalization under perfect and imperfect credibility for a given set of parameter values.

As noted in Buffie (1995), conditions exist under instantaneous liberalization and full employment where a self-fulfilling success (hereafter SFS) is the only equilibrium. For instance, the sustainability of the trade liberalization is ensured if the government holds a sizable reserve cushion, $\Psi - f_1$, or if the jump in savings at t_1 , J_1 , is negative. To understand why a sizable reserve cushion is a sufficient condition for sustained liberalization, notice that the right hand side of (22) is finite. Therefore, a government can ensure that sustained liberalization is a unique equilibrium path if it holds a reserve cushion greater than the finite losses in reserves associated with imperfectly credible liberalization.

Moreover, a negative value for J_1 ensures sustained liberalization is a unique equilibrium, regardless of the sign of f_1 , the long-run elasticity of reserves. Certainly, if J_1 is negative and f_1 is positive, then (22) will never hold as an equality, given a non-negative reserve cushion. In the case of $f_1 < 0$, consider that (22) can be rearranged as

$$\Psi = f_1 \underbrace{\left\{ 1 + \frac{\lambda_2}{\lambda_1 - \lambda_2} \left[1 - e^{(\lambda_2 - \lambda_1)t_1} \right] - e^{\lambda_2 t_1} \right\}}_{\text{non-negative for } t_1 \geq 0} + \frac{J_1}{M_0} \underbrace{\left[\frac{1 - e^{(\lambda_2 - \lambda_1)t_1}}{\lambda_1 - \lambda_2} \right]}_{+}.$$

Thus, as this equation demonstrates, $J_1 < 0$ also ensures sustainability when f_1 is negative. For J_1 to be negative, though,

$$\tau < b_1. \quad (23)$$

Condition (23) implies that trade liberalization is more likely to be sustained when consumers are inclined to smooth consumption and the liberalization produces significant temporary real income gains since savings rises on the transition path.

7. Instantaneous liberalization with transitory unemployment

Unfortunately, condition (23), the sufficiency condition for sustained liberalization in the case of instantaneous liberalization and full employment, does not ensure sustainability when transitory unemployment occurs. To demonstrate, notice that when the tariff h is reduced instantaneously to its target level h^* and transitory unemployment results from the trade liberalization, solution (21) becomes

$$\Psi - f_1 = \gamma(b_1 - b_2) + f_2 \left\{ \frac{\lambda_2}{\lambda_1 - \lambda_2} \left[1 - e^{(\lambda_2 - \lambda_1)t_1} \right] - e^{\lambda_2 t_1} \right\} + \frac{J_2}{M_0} \left[\frac{1 - e^{(\lambda_2 - \lambda_1)t_1}}{\lambda_1 - \lambda_2} \right]. \quad (24)$$

Thus, solution (24) differs from solution (22) in two important ways. First, solution (24) has an additional positive term not found in solution (22), namely $\gamma(b_1 - b_2)$, where, as before, b_1 and b_2 are the real income gain under full employment and transitory unemployment, respectively. Second, the condition

that ensures a negative jump in savings at t_1 is stricter under transitory unemployment: $\tau < b_2$, instead of $\tau < b_1$. To understand the intuition behind these differences, consider that transitory unemployment produces a temporary adverse income shock. As a result, savings falls as people smooth consumption, which contributes to the deterioration of the payments balance.

Figure 2 illustrates the case where imperfectly credible liberalization can lead to a SFF equilibrium under transitory unemployment, but not under full employment. For a broader understanding of how transitory unemployment impacts the sustainability of the liberalization, though, Tables 1 and 2 provide cases where SFS is a unique equilibrium, as indicated by a “U”, when full employment is maintained and when transitory unemployment occurs, respectively. When SFF is also an equilibrium, the tables provide the time of policy reversal. Like the above qualitative analysis, the tables demonstrate that transitory unemployment increases the likelihood of a reversal in the trade liberalization. More specifically, the tables suggest that the size of the parameter space in which sustained liberalization is a unique equilibrium can fall by almost one third if transitory unemployment occurs. Table 2 also shows that a low value for τ and a moderate foreign exchange reserve cushion do not ensure sustained liberalization under transitory unemployment, even though these conditions are sufficient to ensure sustained liberalization in the full employment case. Consequently, the likelihood of policy reversal is greater than previously shown in the literature.

8. Gradual liberalization with full employment

Equation (21) establishes not only that transitory unemployment increases the likelihood that instantaneous tariff reduction will be reversed when the trade liberalization lacks credibility, but also that gradual tariff reduction can extend the life of the liberalization episode. First, for any given time $t < \infty$ after the initiation of the liberalization, a smaller value for k reduces the impact of the jump in savings, J , on the balance of payments. Thus, gradualism reduces the right hand side of solution (21), the equation that determines whether or not a SFF occurs, when condition (23) does not hold. Because the tariff rate falls gradually, the tariff rate is higher than it would be under instantaneous liberalization until the liberalization is complete. The relatively higher tariff prompts consumers to import less than they would have under instantaneous liberalization. This lower spending could potentially offset the impact on the balance of payments of consumers buying imports in anticipation of a reversal of the trade liberalization.

Second, with gradualism, another term appears on the right hand side of equation (21), namely

$$\frac{\Omega(1+h)}{M_0} \left\{ \frac{-k - \lambda_2}{\lambda_1 - \lambda_2} \left[1 - e^{(\lambda_2 - \lambda_1)t_1} \right] e^{-kt_1} + e^{\lambda_2 t_1} - e^{-kt_1} \right\}.$$

This term is more informative when rearranged as

$$\left[\rho(\delta^{-1} - b_i) + k(\tau - b_i) \right] \Pi, \quad (25)$$

where

$$\Pi \equiv \gamma \left[\rho \delta^{-1} - \mu g^{-1} k (\rho + k) \right]^{-1} \left\{ \frac{-k - \lambda_2}{\lambda_1 - \lambda_2} \left[1 - e^{(\lambda_2 - \lambda_1)t_1} \right] e^{-k t_1} + e^{\lambda_2 t_1} - e^{-k t_1} \right\}.$$

Π is negative for a wide range of plausible parameter values.¹⁰ Thus, the impact of gradualism on the sustainability of the reform in the full employment case depends on the sign of $\rho(\delta^{-1} - b_1) + k(\tau - b_1)$. More specifically, if

$$\rho \delta^{-1} + k \tau > (\rho + k) b_1, \quad (26)$$

then for any given finite time following the initiation of the trade liberalization, a slower rate of tariff reduction reduces the right hand side of (21). In other words, when the intertemporal elasticity of substitution is large relative to the real income gain, gradualism reduces the right hand side of equation (21) for any given finite time not only because the impact of the jump in savings, J , is reduced, but also because condition (26) is met.

From this qualitative analysis, one might conclude at first glance that gradualism increases the likelihood of sustained liberalization since it reduces the right hand side of equation (21) for any given finite time. However, consider that time is held constant for the above analysis. Even though at a given point in time, the right hand side of equation (21) is smaller under gradual liberalization than under instantaneous liberalization, a time will come under gradual liberalization where the representative agent faces virtually the same tariff levels and, thus, the same incentives to binge on import goods as under instantaneous liberalization. Consequently, gradualism may serve only to extend the duration of the liberalization episode, but not increase the likelihood of sustained liberalization, as the terms associated with gradualism in equation (21) seem to suggest. In

particular, the rate of tariff reduction, k , does not stand independently of the endogenously-determined expected time of policy reversal, t_1 in equation (21), indicating that gradualism affects the realized value of t_1 , but does not impact the sustainability of the liberalization. However, a clear analytical solution regarding the impact of gradualism on the likelihood of sustained liberalization cannot be derived due to the fact that the rate of tariff reduction, k , appears in both multiplicative and exponential forms in equation (21).

Figure 3 demonstrates how gradualism can increase the duration of the liberalization episode, but not increase the likelihood of sustained liberalization. To further illustrate, numerical solutions for equation (21) are computed for a range of plausible parameter values. In particular, Tables 4 and 5 provide cases where sustained trade liberalization is a unique equilibrium, denoted by a “U”, for $k = .46$ and $k = 2.3$, respectively. When SFF is an equilibrium, the tables also provide the time of policy reversal. A comparison of these tables to Table 1 shows that there are no cases where gradual liberalization is sustained but instantaneous liberalization is not. These tables are part of a larger body of sensitivity analysis for the model that indicate that gradualism does not affect the sustainability of trade liberalization, contrary to the claims of Dornbusch (1992) and Takacs (1990) and the results in Froot (1988).

Even though the tables do not show that gradualism increases the likelihood of sustained liberalization, they do show that the duration of the liberalization episode can be significantly longer under gradual liberalization than under instantaneous liberalization. For $k = .46$, the liberalization episode can last

more than six years longer under gradual liberalization than under instantaneous liberalization. Even under the relatively fast liberalization of $k = 2.3$, the life of the liberalization episode can be more than a year longer than under instantaneous liberalization.

9. Gradual liberalization with transitory unemployment

In section 8, gradualism was shown to extend the life of imperfectly credible liberalization episodes when full employment is maintained and the intertemporal elasticity of substitution, τ , is large relative to the real income gain from liberalization, b_1 . Gradualism can also be shown to extend the life of imperfectly credible trade liberalization that produces transitory unemployment when τ is large relative to b_2 , the real income gain under transitory unemployment. The difference between these two cases, though, is that $b_1 > b_2$. Therefore, gradual tariff reduction is more effective in extending the life of the liberalization episode when transitory unemployment is a byproduct of the liberalization. This result holds true because until the liberalization is complete, gradualism's relatively higher tariff is associated with a smaller contraction in production than would occur if the tariff rate was reduced instantaneously to the target level. A comparison of Table 2 to Table 6 demonstrates this point. For $k = .46$, the life of the liberalization episode can be more than five years longer under gradual trade liberalization than under instantaneous trade liberalization. As in the full employment case though, the tables show that gradualism extends the life of the liberalization episode, but does not increase the likelihood of sustained

liberalization. Thus, despite claims to the contrary, the preceding analysis suggests that policymakers cannot adjust the speed of liberalization to ensure the sustainability of the liberalization policy. If a self-fulfilling reversal of the trade liberalization would occur under instantaneous tariff reduction, then gradualism only postpones the inevitable in an economy with a closed capital account. The results might differ, however, if labor's decision to move to the export sector depends on the length of time between the initiation of the policy and its expected reversal. In such a scenario, sustainability may very well depend on the speed of the liberalization.

10. Impact of transitory unemployment and gradualism with an open capital account

In the above closed capital account case, consumers reduce money balances in order to binge on imports if they believe the trade liberalization will be temporary, which, in turn, can produce a significant cumulative payments deficit. In an economy with an open capital account though, reduction in money balances is not the only way for consumers to dissave. For example, the consumer could finance their import binge by selling foreign bonds. Thus, imperfectly credible trade liberalization may produce very different dynamics under an open capital account. Accordingly, this section examines the impact of transitory unemployment and the rate of tariff reduction on imperfectly credible trade liberalization in an economy with an open capital account.

In analyzing the open capital account case, the characteristics of production and the labor market remain the same as in the closed capital account case. Also, as in the previous case, the representative agent maximizes utility of consumption and non-pecuniary services yielded by real money balances, but the maximization is subject to different constraints:

$$A = M + B, \quad (27)$$

$$E + S = R(P_m, L_m) + h[D(P_m, E) - Q_m] + r(B + Y), \quad (28)$$

$$\dot{A} = S, \quad (29)$$

where A represents financial assets, B represents foreign bonds, Y represents the central bank's foreign exchange reserves, and S now represents the accumulation of financial assets over time. As the budget constraint shows, interest on government reserves is rebated to the public in lump sum.

The budget constraint can be rewritten by substituting for B and S from the wealth constraint and equation (29). Accordingly, the Hamiltonian reads

$$H = e^{-\rho t} \left\langle V(P_m, E) + \phi(M/P_m^\gamma) \right. \\ \left. + \pi \left\{ R(P_m, L_m) + h[D(P_m, E) - Q_m] + r(A - M + Y) - E \right\} \right\rangle,$$

where π is the multiplier associated with wealth accumulation.

By maximizing the Hamiltonian with respect to expenditures, nominal money balances, and savings, the following first order conditions can be derived:

$$\pi = V_E(P_m, E), \quad (30)$$

$$r\pi = \phi'(M/P_m^\gamma) / P_m^\gamma, \quad (31)$$

$$\dot{\pi} = \pi(\rho - r). \quad (32)$$

To ensure convergence to a stationary equilibrium, the rate of time preference is assumed to equal the world market interest rate. Thus, equations (30) and (32) imply

$$0 = V_{EP} \dot{P}_m + V_{EE} \dot{E}. \quad (33)$$

From solution (33), the budget constraint, and the policy rule, the economy's dynamics are determined. Working toward this end, totally differentiate the budget constraint and substitute for L_m from equations (1) and (2). On the transition path, this yields

$$\dot{E} = D(1-b_i) \dot{h} + g^{-1}(rS - \dot{S}), \quad (34)$$

under the simplifying assumption that the money supply equals the government's foreign exchange reserves. By deriving the differential equation for savings from (33) and (34), the economy's dynamics are

$$\begin{bmatrix} \dot{S} \\ \dot{h} \end{bmatrix} = \begin{bmatrix} r & -gkD(\tau-b_i) \\ 0 & -k \end{bmatrix} \begin{bmatrix} S \\ h-h^* \end{bmatrix}. \quad (35)$$

If the tariff reduction is perceived as temporary by the private sector, S and h will evolve over the period $(0, t_1)$ according to

$$S(t) = c_1 e^{rt} + \frac{gkD(\tau-b_i)}{r+k} c_2 e^{-kt}, \quad t \leq t_1, \quad (36)$$

$$h(t) - h^* = c_2 e^{-kt}, \quad t \leq t_1, \quad (37)$$

where c_1 and c_2 are constants determined from the initial conditions and t_1 is the time of the policy reversal. Solutions for c_1 and c_2 are found using the same method employed in the appendix for the closed capital account case. Given the solutions for these constants, equation (36) becomes

$$S(t) = J_i \left\{ \left[1 - r(1-\nu)e^{-kt} / (r+k) \right] e^{r(t-t_1)} - k(1-\nu)e^{-kt} / (r+k) \right\} \hat{P}_m, \quad t \leq t_1. \quad (38)$$

In order to derive the foreign exchange reserve loss under temporary liberalization, note that a perfect foresight equilibrium requires the multiplier π be constant after it jumps at t_0 . Exploiting this information, first order conditions (30) and (31) imply

$$\frac{M(t) - M_0}{M} = \frac{E(0) - E_0}{E} + \gamma(1-\tau)(1-\nu)(1 - e^{-kt}) \hat{P}_m. \quad (39)$$

From equation (39), the cumulative payments surplus can be determined. Working toward this end, the jump in expenditures at t_0 is derived by substituting for $S(0)$ from equation (38) at t_0 into the total derivative of the budget constraint at t_0 . Given that foreign bonds and the central bank's foreign exchange reserves are predetermined variables at t_0 , this yields

$$E(0) - E_0 = \gamma \left[(1-b_i)\nu + (b_i - \tau)\Upsilon \right] \hat{P}_m,$$

where

$$\Upsilon \equiv e^{-rt_1} - (1-\nu) \left(r e^{-(r+k)t_1} + k \right) / (r+k).$$

Consequently, the cumulative payments surplus is determined by

$$\frac{[M(t) - M_0] / M_0}{\hat{P}_m} = \gamma \left[(1-b_i)\nu + (b_i - \tau)\Upsilon + (1-\tau)(1-\nu)(1 - e^{-kt}) \right], \quad t \leq t_1. \quad (40)$$

As in the closed capital account case, if the foreign exchange reserve loss exceeds Ψ , then the government will immediately restore the tariff to its pre-liberalization level. Thus, at t_1 , the time when the reform is reversed, Ψ equals

the reserve loss in equation (40). Accordingly, self-fulfilling failure is an equilibrium if

$$\Psi - f_1 = \gamma \left\{ b_1 - b_i + (b_i - \tau) \left[e^{-rt_1} + \frac{r(1-\nu)}{r+k} (1 - e^{-(r+k)t_1}) \right] + (\tau - 1)(1 - \nu) e^{-kt_1} \right\} \quad (41)$$

holds as an equality for some positive value of t_1 or if the right hand side of equation (41) is larger than the left hand side at $t = 0$, where f_1 denotes the impact of a credible trade liberalization on the balance of payments as derived in section 3.

If the tariff rate is reduced to its target instantaneously and full employment is maintained, equation (41) becomes

$$\Psi - f_1 = \gamma (b_1 - \tau) e^{-rt_1}. \quad (42)$$

Thus in this special case of tariff liberalization originally derived in Buffie (1995), $b_1 < \tau$ ensures that SFS is a unique equilibrium. Notably, this condition for sustained liberalization is exactly opposite of condition (23), the condition for sustained liberalization in the closed capital account. As discussed in Buffie (1995), this difference arises because under an open capital account, the interest rate is fixed. Thus, by equation (31), lower saving is associated with higher money balances, which contrasts to the closed capital account case where the only way to dissave is to reduce money balances.

Like the closed capital account case, though, transitory unemployment increases the likelihood of a SFF. To illustrate, again assume that the tariff rate is instantaneously reduced to its target level. Thus, if transitory unemployment arises, equation (41) becomes

$$\Psi - f_1 = \gamma \left[b_1 - b_2 + (b_2 - \tau) e^{-r t_1} \right], \quad (43)$$

which differs from equation (42) in that equation (43) has the additional positive term $\gamma(b_1 - b_2)(1 - e^{-r t_1})$. Accordingly, the sufficiency condition for sustained liberalization in the case of instantaneous liberalization and full employment, $b_1 < \tau$, does not ensure sustained liberalization when transitory unemployment occurs. In effect, transitory unemployment produces a temporary adverse income shock, which causes consumers to reduce their spending and, thus, their money balances.

Equation (41) also demonstrates that the rate of tariff reduction affects the duration of the liberalization episode. To illustrate, notice that when full employment is maintained throughout the liberalization episode, equation (41), the general condition for sustained liberalization, differs from equation (42), the special case of instantaneous liberalization, in that equation (41) has an additional term, namely

$$\gamma \left[r(b_1 - \tau) \left(1 - e^{-(r+k)t_1} \right) / (r+k) + (\tau - 1) e^{-k t_1} \right]. \quad (44)$$

Likewise, if transitory unemployment is a byproduct of the liberalization, equation (41) differs from equation (43) in that equation (41) has the additional term

$$\gamma \left[r(b_2 - \tau) \left(1 - e^{-(r+k)t_1} \right) / (r+k) + (\tau - 1) e^{-k t_1} \right]. \quad (45)$$

As in the closed capital account case, though, the terms (44) and (45) demonstrate that the case for gradualism is strongest when the real income gain, b_i , is small. Since $b_1 > b_2$, gradualism is, therefore, more likely to extend the

duration of the liberalization episode when transitory unemployment occurs. The intuition behind this result is the same as it was in the closed capital account case: Under gradualism, the tariff rate is higher than it would be under instantaneous liberalization until the liberalization is complete. Thus, gradualism's relatively higher tariff is associated with a smaller contraction in production than would occur if the tariff rate was reduced instantaneously to the target level.

According to the terms (44) and (45), the effectiveness of gradualism in extending the duration of the liberalization episode also depends on the intertemporal elasticity of substitution, τ . However, the impact of the intertemporal elasticity of substitution on gradualism's effectiveness is not readily apparent because two opposing effects are at work. With regards to the first one, consider that for any given time following the initiation of imperfectly credible liberalization, the temporary real income gains are more fully realized under instantaneous tariff reduction than under gradual tariff reduction. Thus, this effect suggests that consumers will not binge on imports as much under gradualism as under instantaneous liberalization when τ is small. Nonetheless, a second, opposing effect suggests that gradualism is most effective in extending the liberalization when τ is large. To illustrate, consider that under gradualism, real income gains will rise until the liberalization is reversed. The expected future income gains will prompt consumers to increase import purchases, particularly if τ is small. Of these two opposing effects, the first one will dominate for low values of $t \leq t_1$, while the second one will dominate for high values of t_1 .

Gradualism not only can affect the duration of the liberalization episode under an open capital account, but also it can affect the size of the cumulative payments deficit, and, thus, the likelihood of sustained liberalization in certain circumstances. More specifically, notice that in the terms (44) and (45), $\gamma r(b_i - \tau)/(r + k)$ stands independently of the endogenously-determined expected time of policy reversal, t_1 , in equation (41), which indicates that gradualism can affect not only the time of reversal, but also the cumulative loss in foreign exchange reserves. In fact, conditions under which gradualism increases the likelihood of sustained liberalization can be found from the terms (44) and (45). In particular, the terms (44) and (45) are negative when $b_i < \tau < 1$ for $i = 1, 2$, respectively. Unfortunately though, this sufficiency condition for gradualism to increase the likelihood of sustained liberalization is actually more restrictive than $b_1 < \tau$, the sufficiency condition for sustained liberalization when the tariff rate is reduced instantaneously and full employment is maintained. As noted above though, the condition $b_1 < \tau$ is not sufficient for sustained liberalization when transitory unemployment occurs. Consequently, gradualism can increase the likelihood of sustained liberalization when transitory unemployment occurs if $b_2 < \tau < 1$, as illustrated in Figure 4. Thus, in contrast to the closed capital account case, conditions exist in an economy with an open capital account in which gradualism sustains imperfectly credible liberalization.

Although gradualism can increase the likelihood of sustained liberalization for an economy with an open capital account, claims that gradualism will necessarily increase the likelihood of sustained liberalization

cannot be supported since the impact of gradualism depends on the values of b_i and τ . In fact, plausible parameter values exist for which gradualism reduces the likelihood of sustained liberalization under an open capital account. To illustrate, notice that if $\tau > b_1 > 1$ and full employment is maintained, solution (41) shows that trade liberalization would be sustained if the tariff rate was reduced to its target level instantaneously, but would be reversed at $t_1 = 0$ if it was reduced gradually and the liberalization lacked credibility.¹¹ To understand why the reversal would only occur under gradual liberalization, consider that higher real income gains are realized initially under instantaneous liberalization than under gradual liberalization. Thus, if the agent is not interested in smoothing consumption, her initial demand for money balances is higher under instantaneous liberalization as her consumption is higher. Consequently, policymakers should reduce the tariff rate gradually only if they anticipate that labor will not relocate to the export sector because of the policy's lack of credibility and the condition $b_2 < \tau < 1$ is met.

11. Conclusions

The preceding analysis provides two important new insights about imperfectly credible trade liberalization. First, the sustainability of the liberalization depends not only on the expectations of consumers, but also on the expectations of labor, who may choose not to seek employment in the export sector when the trade liberalization lacks credibility. In fact, transitory unemployment can cause an otherwise sustainable liberalization to be reversed.

Second, the rate of tariff reduction cannot necessarily be adjusted to improve the likelihood of sustained trade liberalization. For an economy with a closed capital account, gradual tariff reduction serves only to extend the liberalization episode. For an economy with an open capital account, gradualism can increase the likelihood of sustained liberalization, but only in certain circumstances. Thus, the grim reality is that the success of trade liberalization rests squarely on the expectations of consumers and labor.

Given these results, it is even more imperative that reformist governments take measures to ensure credibility so that a SFS is the unique equilibrium outcome of trade liberalization. For instance, policymakers could signal their commitment to trade liberalization by joining a free trade area or regime, as Brazil, Columbia, and Mexico did when they became members of the World Trade Organization. The preceding analysis does not even rule out a role for the speed of liberalization in ensuring credibility. For *psychological* reasons, the speed of liberalization may matter for credibility. On one hand, an instantaneous liberalization may signal stronger commitment than gradual liberalization. On the other hand, if expectations of policy reversal decline over time, gradualism may be the answer since the preceding analysis shows that gradualism can extend the liberalization episode under a closed capital account. Whatever the means to ensure credibility though, this paper demonstrates the need for policymakers to consider them, particularly if labor decisions are influenced by the policy's credibility.

Appendix

In order to find the loss in foreign exchange reserves associated with imperfectly credible trade liberalization under a closed capital account, solutions for the constants q_1 , q_2 , q_3 , and y must be found. Working toward this end, equation (17) at $t = 0$ yields

$$q_3 = (h_0 - h^*)(1 - v), \quad (\text{A.1})$$

where

$$v \equiv [h_0 - h(0)] / (h_0 - h^*).$$

The term v equals unity when the tariff rate is reduced instantaneously, but is equated to zero when the tariff rate is reduced gradually.

Given the solution for q_3 , the constants q_2 , q_3 , and y can be derived by utilizing equation (14) and its equivalent under transitory unemployment,

$$f_2 \equiv \hat{M} / \hat{P}_m = \gamma(1 - b_2). \quad (\text{A.2})$$

More specifically, the solution for q_2 is found by substituting equations (14), (A.1), and (A.2) into equation (16) at $t = 0$. Accordingly,

$$q_2 = -q_1 - [f_i M_0 - \Omega(1 + h)(1 - v)] \hat{P}_m, \quad i = 1, 2.$$

Substituting this equation into (16) gives the path of nominal money balances during the liberalization phase,

$$M(t) - M_0 = q_1 (e^{\lambda_1 t} - e^{\lambda_2 t}) + [f_i M_0 (1 - e^{\lambda_2 t}) + \Omega(1 + h)(1 - v)(e^{\lambda_2 t} - e^{\lambda_3 t})] \hat{P}_m. \quad (\text{A.3})$$

Since current trade policy does not affect current values of nominal money balances, M is predetermined. Thus, at time t_1 , equation (A.3) must have

the same value for M as equation (19). Accordingly, (19) and (A.3) can be equated to produce

$$ye^{\lambda_2 t_1} + q_1(e^{\lambda_2 t_1} - e^{\lambda_1 t_1}) = \left[f_i M_0 (1 - e^{\lambda_2 t_1}) + \Omega(1+h)(1-\nu)(e^{\lambda_2 t_1} - e^{\lambda_3 t_1}) \right] \hat{P}_m. \quad (\text{A.4})$$

To compute the second equation needed to solve for q_1 and y , recall that foreseen jumps in V_E , the marginal utility of expenditures, are inconsistent with optimizing behavior because a smoother consumption path would increase the utility of the representative agent. Thus, in a perfect foresight equilibrium, savings must jump at t_1 , the time when the trade liberalization is reversed, in order to keep V_E constant. Exploiting this information and the formula derived from Roy's identity, $\tau = 1 + V_{PE} / V_{EE} D$, (7), (10), and (17) imply that the jump in S at t_1 is

$$S(t_1^+) - S(t_1^-) = J_i \hat{P}_m(t_1), \quad (\text{A.5})$$

where

$$J_i \equiv D(1 + hc_x)(\tau - b_i).$$

Equations (15) and (18) also provide a solution for the jump in savings at time t_1 . Equating that solution to the one in (A.5) generates

$$\begin{aligned} y\lambda_2 e^{\lambda_2 t_1} + q_1(\lambda_2 e^{\lambda_2 t_1} - \lambda_1 e^{\lambda_1 t_1}) \\ = J_i \hat{P}_m(t_1) - \left[f_i M_0 \lambda_2 e^{\lambda_2 t_1} - \Omega(1+h)(1-\nu)(\lambda_2 e^{\lambda_2 t_1} - \lambda_3 e^{\lambda_3 t_1}) \right] \hat{P}_m. \end{aligned} \quad (\text{A.6})$$

Together, equations (A.4) and (A.6) determine the solutions for the constants q_1 and y . By substituting the expression for q_1 into (A.3), the solution for the path of money balances (20) is generated.

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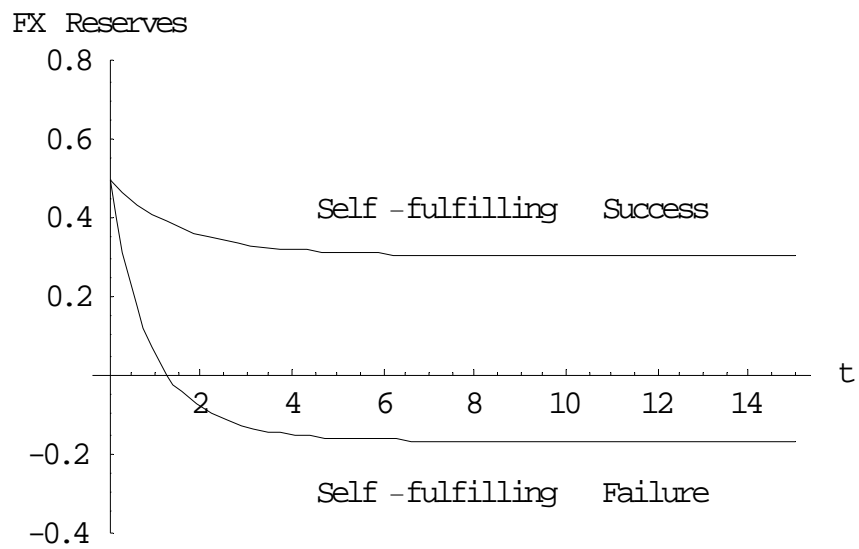


Figure 1: The expectation of policy reversal can cause an otherwise sustainable liberalization to be reversed. (In generating this particular graph, instantaneous tariff reduction and full employment were assumed. Also, ε and τ were set at 0.2 and 0.5, respectively.)

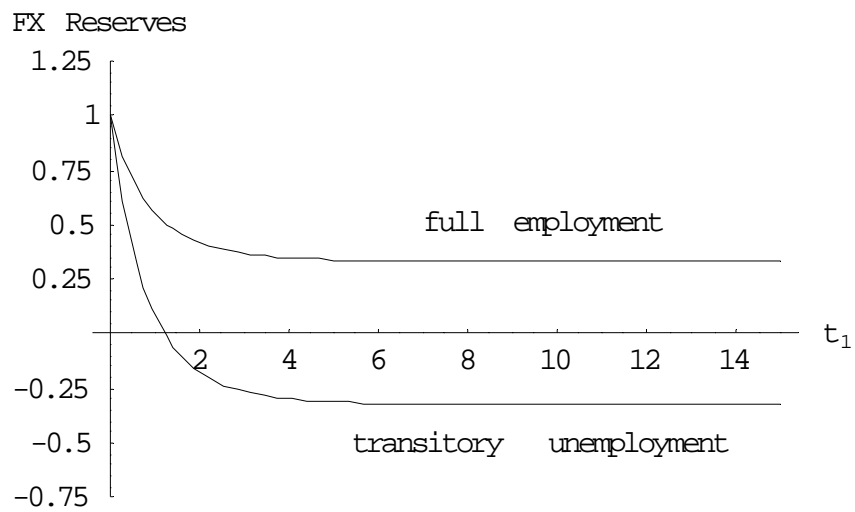


Figure 2: Transitory unemployment decreases the likelihood of sustained liberalization. (In generating this particular graph, instantaneous tariff reduction was assumed. Also, ε and τ were set at 0.2 and 0.5, respectively.)

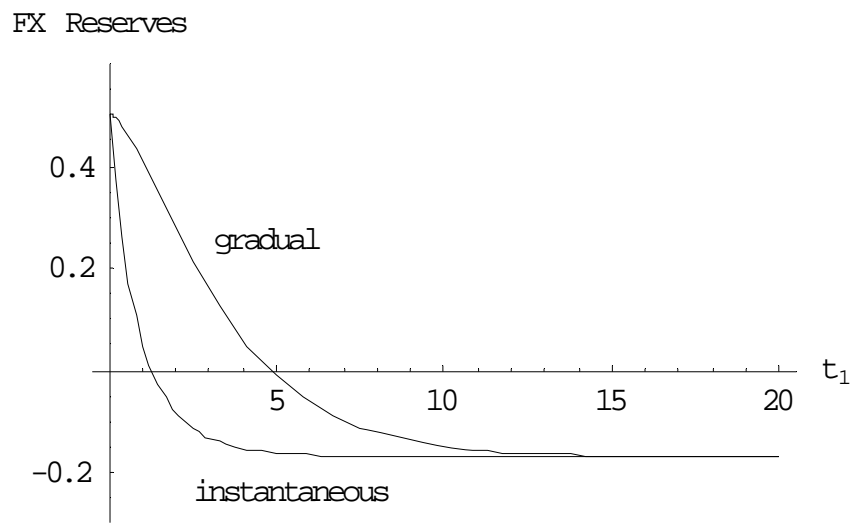


Figure 3: For an economy with a closed capital account, gradualism extends the life of the liberalization episode, but does not increase the likelihood of sustained liberalization. (In generating this particular graph, full employment was assumed. Also, ε , τ , and k were set at 0.2, 0.5, and 0.46, respectively.)

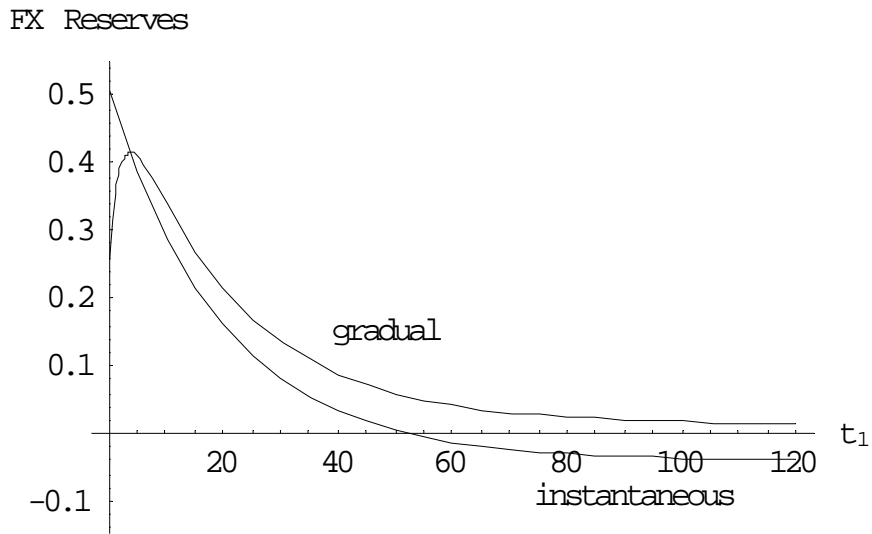


Figure 4: For an economy with an open capital account, gradualism can increase the likelihood of sustained liberalization in certain circumstances when transitory unemployment arises. (In generating this particular graph, ε , τ , k , and Ψ were set at values of 0.2, 2, 0.46, and $f_1 + 0.05$, respectively.)

Table 1: Full Employment Case						
	τ					\square
ε	0.1	0.25	0.5	1	2	Ψ
0.2	U	2.68	0.33	0.12	0.05	$f_1 (.21)$
	U	U	1.29	0.32	0.13	0.5
	U	U	U	0.87	0.28	1
	U	U	U	U	0.75	2
2	U	U	U	0.12	0.02	$f_1 (.06)$
	U	U	U	U	0.20	0.5
	U	U	U	U	0.48	1
	U	U	U	U	2.26	2

Table 2: Transitory Unemployment Case						
	τ					
ε	0.1	0.25	0.5	1	2	Ψ
0.2	0.38	0.24	0.14	0.08	0.04	$f_1 (.21)$
	1.59	0.75	0.40	0.21	0.11	0.5
	U	U	1.24	0.49	0.23	1
	U	U	U	2.16	0.56	2
2	U	U	0.34	0.04	0.02	$f_1 (.06)$
	U	U	U	0.51	0.15	0.5
	U	U	U	2.40	0.34	1
	U	U	U	U	0.98	2

Table 3: Parameter Values for Sign Test			
Parameter	Minimum Value	Maximum Value	Interval
ρ	0.01	0.11	0.025
δ	0.5	2	0.25
μ	0.05	0.2	0.025
c_x	0.6	0.9	0.05
H	0.15	1.05	0.15
K	0.2	2.7	0.25
t_1	0.05	12	0.05

Table 4: Gradual Liberalization with $k = .46$						
Full Employment Case						
	τ					
ε	0.1	0.25	0.5	1	2	Ψ
0.2	U	6.22	1.86	0.96	0.58	$f_1 (.21)$
	U	U	4.85	1.91	1.03	0.5
	U	U	U	4.00	1.80	1
	U	U	U	U	3.69	2
2	U	U	U	0.96	0.34	$f_1 (.06)$
	U	U	U	U	1.42	0.5
	U	U	U	U	2.68	1
	U	U	U	U	8.75	2

Table 5: Gradual Liberalization with $k = 2.3$						
Full Employment Case						
	τ					
ε	0.1	0.25	0.5	1	2	Ψ
0.2	U	3.28	0.77	0.40	0.24	$f_1 (.21)$
	U	U	2.12	0.77	0.43	0.5
	U	U	U	1.62	0.71	1
	U	U	U	U	1.45	2
2	U	U	U	0.40	0.14	$f_1 (.06)$
	U	U	U	U	0.57	0.5
	U	U	U	U	1.04	1
	U	U	U	U	4.02	2

Table 6: Gradual Liberalization with $k = .46$
Transitory Unemployment Case

	τ					
ε	0.1	0.25	0.5	1	2	Ψ
0.2	1.97	1.47	1.08	0.75	0.52	$f_1 (.21)$
	5.18	3.28	2.19	1.42	0.91	0.5
	U	U	4.92	2.63	1.54	1
	U	U	U	7.72	2.96	2
2	U	U	1.71	0.52	0.29	$f_1 (.06)$
	U	U	U	2.68	1.16	0.5
	U	U	U	8.32	2.06	1
	U	U	U	U	4.56	2

Endnotes

¹ See studies in Krueger (1978), Papageorgiou *et al.* (1991), and, as noted in Collier and Gunning (2000), Foroutan and Nash (1994).

² See, for example, Rodrik (1990) and Reinikki (2000).

³ In section 5, these parameter values are shown to be realistic for developing economies.

⁴ Under homothetic preferences, $c_x = 1 - \gamma$.

⁵ As noted in Calvo (1987) and (1988), temporary liberalization is equivalent to imperfectly credible liberalization.

⁶ Economic reforms can be cancelled for a multitude of reasons. For example, in Mehlum (2001a) and (2001b), self-fulfilling failures can arise if unemployment persists too long or wages fall too far. Here, I focus on the loss in foreign exchange reserves as the trigger for the policy reversal since “abortions of [trade] liberalizations are almost universally preceded by a balance of payments deterioration” (Papageorgiou *et al.*, 1991: 274).

⁷ For a summary of the studies that have estimated the intertemporal elasticity of substitution for developing countries, see Agénor and Montiel (1996: 353).

⁸ See, for example, studies in Behrman (1982) and Mansur and Whalley (1984).

⁹ The value for the cost share of labor in the import-competing sector is consistent with data for 1991 from the *World Development Report, 1994*. More specifically, the report shows that the simple average share of earnings by employees in manufacturing's value added was 28.2% for low-income countries and 31.3% for middle-income countries. The value for the cost share of labor in the export sector is consistent with the finding in the country studies by Krueger *et al.* (1981b) that exports require on average 50% more labor per unit of value added than import-competing goods. For a summary of these results, see Krueger (1981a: table 2).

¹⁰ Table 3 lists the range of parameter values used to verify the sign of Π .

¹¹ A policy reversal can not even be ruled out if the government is able to borrow foreign exchange reserves to cover the initial deficit because the liberalization does not generate sufficient reserves across steady states for the government to be able to repay the loan.