Does Pleasing Export-Oriented Foreign Investors Help Your Balance of Payments? A General Equilibrium Analysis

(Available on Request Appendix)

1 Derivation of the Excess Demand Equations, the IS Equation, and the Balance of Payments Equation

Consider eqs (1) – (4) from the text of the paper.

$$P_N\bar{Q}_N = W_N a_N \bar{Q}_N + R_N \tag{1}$$

$$EP_T^* Q_T = W_T a_T Q_T + R_T + EP_Z^* Z_T^* + P_N Z_T^N \tag{2}$$

$$P_T^* = (1+\tau)\varepsilon^* \tag{3}$$

$$\varepsilon^* = \frac{W_T a_T}{E} + P_Z^* a_{ZT} + \left(\frac{P_N}{E} - P_Z^*\right)\psi a_{ZT} \tag{4}$$

By definition, $u_T = \frac{Q_T}{K_T} \leq \frac{Q_{T,max}}{K_T}$; $\frac{\bar{Q}_N}{K_N} = u_N = \frac{\bar{Q}_{N,max}}{K_N}$. Dividing both sides of equation (1) by $\bar{Q}_N$ yields:

$$P_N = W_N a_N + \frac{R_N}{\bar{Q}_N}$$

Dividing both sides of equation (2) by EQ_T yields, after some manipulation:

$$P_T^* = \frac{W_T a_T}{E} + \frac{R_T}{EQ_T} + P_Z^* a_{ZT} + \left(\frac{P_N}{E} - P_Z^*\right)\psi a_{ZT}$$

The share of N-sector output proceeding to workers can be defined as, $\Pi_{NW} = w_N a_N / P_N$. Or, assuming fixed real wages in terms of the consumption good:

$$\Pi_{NW} = \bar{w}_N a_N \tag{5a}$$

and,

$$\Pi_{NC} = 1 - \bar{w}_N a_N \tag{5b}$$

Total nominal profits in the N-sector are the residual left over after wages. In other words, $EP_Z^* r_N K_N = P_N \bar{Q}_N - P_N \bar{w}_N a_N \bar{Q}_N$. This yields the profit rate, which can be expressed as:

$$r_N = \Pi_{NC} \frac{\bar{Q}_N}{K_N} \frac{P_N}{EP_Z^*}$$

Next, the profit share in the EPZ is given by,

$$\Pi_{TC} = \frac{r_T K_T EP_Z^*}{Q_T EP_T^*}$$

which can be re-written, using the definition of u_T, as:

$$\Pi_{TC} = \frac{r_T P_Z^*}{u_T P_T^*}$$

Substituting from eqs 2 and 3:

$$(1+\tau)\varepsilon^* = \frac{r_T P_Z^*}{u_T} + \varepsilon^*$$

the last two equations yield the profit share of output in the T-sector in following form:

$$\Pi_{TC} = \frac{\tau}{1+\tau} \tag{5c}$$

Since N-caps consume both goods while workers (in both sectors) consume only the domestically produced non-tradable good, their respective nominal expenditure on the non-tradable good can be expressed as:

$$P_N C_N^{NC} = (1-t_N)(1-\alpha) c_N R_N \tag{6a}$$

where

$$\alpha = a \left(\frac{EP_T^*}{P_N} \right)^{1-\eta} ; \qquad \eta_1 > 1$$

$$EP_T^* C_{TNC} = (1-t_N) \alpha c_N R_N \tag{6b}$$

and,

$$P_N C_N^{iW} = W_i a_i i; \quad i = N, T \tag{6c}$$

The balanced budget condition implies that nominal government spending can be expressed as follows:

$$P_N G = t_N R_N + t_T R_T \tag{7}$$

The volume of exports is a function of world demand (income) and relative prices:

$$X = Y \left(\frac{P_T^*}{P_Z^*} \right)^{-\sigma}; \qquad \sigma > 0 \tag{8}$$

Domestic investment in the N-sector is a function of domestic savings:

$$I_N = (1 - t_N)(1 - c_N)\Pi_{NC} \frac{P_N}{EP_Z^*} \bar{Q}_N \tag{9}$$

Investment in the T-sector is a function of unrepatriated profits and FDI inflows. The latter in turn is a function of total profits in the T-sector:

$$I_R = (1 - t_T)\Pi_{TC} Q_T \frac{P_T^*}{P_Z^*} \tag{10}$$

$$I_{FDI} = \xi_1 (1 - t_T) R_T \tag{11}$$

Equations (1) - (11) imply the existence of three key relative prices, which can be defined as:

$$e_{TN} = \frac{EP_T^*}{P_N}, \quad e_{ZN} = \frac{EP_Z^*}{P_N}, \quad e_{TZ} = \frac{e_{TN}}{e_{ZN}} = \frac{P_T^*}{P_Z^*}$$

Our set-up implies the following zero excess demand condition for non-tradables:

$$C_N^{NC} + C_N^{NW} + C_N^{TW} + Z_T^N + G - \bar{Q}_N = 0$$

Substituting from equations (5a), (5b), (5c), (6a), (6b), (6c), (7), and using the definition of Z_T^N yields:

$$\begin{aligned} EDN &= [(1 - t_N)(1 - \alpha)c_N]\,\Pi_{NC}\bar{Q}_N + \Pi_{NW}\bar{Q}_N + e_{TN}\Pi_{TW}Q_T \\ &+ \psi a_{ZT} Q_T + (t_N \Pi_{NC}\bar{Q}_N + e_{TN} t_T \Pi_{TC} Q_T) - \bar{Q}_N = 0 \end{aligned} \tag{12}$$

Similarly, the zero excess demand condition for the tradable good can be specified as follows:

$$C_T^{NC} + X - Q_T = 0$$

Substituting from equations (5c), (6b), and (8):

$$(1 - t_N)\frac{\alpha c_N \Pi_{NC}}{e_{TN}}\bar{Q}_N + Y e_{TZ}^{-\sigma} - Q_T = 0 \tag{13}$$

The IS equation, can be specified as in the following form:

$$\begin{aligned} P_N\bar{Q}_N + EP_T^* Q_T - P_N Z_T^N - EP_Z^* Z_T^* &= P_N C_N^{NC} + P_N C_N^{NW} + P_N C_N^{TW} + EP_T^* C_T^{NC} + EP_Z^* I_R \\ &+ EP_Z^* I_N + P_N G + [EP_T^* X - EP_Z^* Z_T^* - EP_Z^* I_N - EP_Z^* I_R] \end{aligned}$$

which after substitution from equations (1), (2), (6a), (6c), (8), and (7), and some manipulation, leads to the following expression:[1]

$$Y e_{TZ}^{1-\sigma} - (1-\psi)a_{ZT}^* - (1-t_N)r_N K_N(1-c_N) - (1-t_T)r_T K_T = 0$$

Finally, the balance of payments condition (inclusive of remitted profits) can be expressed as follows:

$$EP_T^* Q_T - EP_Z^* Z_T^* - EP_Z^* I_R - EP_Z^* I_N - EP_Z^* I_{FDI} - EP_Z^* \Delta B = 0$$

The proportion of new FDI inflows financed out of foreign exchange-denominated resources is defined as:

$$\lambda = \omega\left(\frac{Y(e_{TZ})^{1-\sigma}}{Q_T}\right); \quad \omega > 0 \tag{14}$$

Substituting from equations (3), (5c), (9), (10), (11), and (12):

$$\begin{aligned} BPS &= Y(e_{TZ})^{1-\sigma} - (1-\psi)a_{ZT}Q_T - (1-t_T)e_{TZ}\Pi_{TC}Q_T - (1-t_N)(1-c_N)\frac{\Pi_{NC}}{e_{ZN}}\bar{Q}_N \\ &- (1-\lambda)[\xi_1(1-t_T)e_{TZ}\Pi_{TC}Q_T] - \Delta B = 0 \end{aligned} \tag{15}$$

[1] Recall that all capital goods are imported.

2 The Relative Slopes of the Three Curves

The relative slopes can be analyzed under four different scenarios, depending on the assumptions made regarding the nature of EPZ production and output:

Case EE: International demand for the tradable good is relatively *price-elastic*, i.e., $\sigma > 1$, and the EPZ is an isolated *enclave* that purchases very few intermediate inputs from the domestic economy, i.e., ψ is relatively small.

Case EA: International demand for the tradable good is relatively *price-elastic*, i.e., $\sigma > 1$, and the EPZ is *assimilated* in the sense that it purchases a large proportion of its intermediate inputs from the domestic economy, i.e., ψ is relatively large.

Case IE: International demand for the tradable good is relatively *price-inelastic*, i.e., $\sigma < 1$, and the EPZ is an isolated *enclave*, i.e., ψ is relatively small.

Case IA: International demand for the tradable good is relatively *price-inelastic*, i.e., $\sigma < 1$, and the EPZ is *assimilated*, i.e., ψ is relatively large.

The main text of the paper is limited to discussing the cases where international demand for the tradable good is relatively price-inelastic. Here we mainly focus our attention on the other two cases.

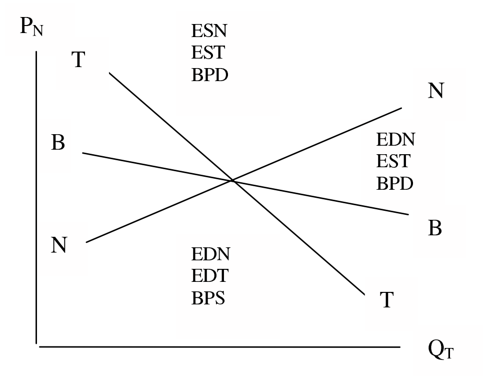
Consider first the slope of the NN-curve. Let us look first at the expression for EDN_P after defining the proportion of domestic intermediate costs as $\Lambda = \dfrac{P_N \psi a_{ZT}}{E\varepsilon^*}$; $0 \leq \Lambda \leq 1$. Notice that the Λ terms complement each other (given that $\eta > 1$, both are effectively positive). Thus, for $\Lambda = 0$, EDN_P is negative, and becomes less so (falls in absolute magnitude) as Λ increases. In other words, the higher Λ is, the lower the change in excess demand/supply in response to a given change in P_N. Moreover, the expression for EDN_u indicates that the higher ψ is, the higher EDN_u is. In other words, the higher ψ is, the change in excess demand/supply for non-tradables, for a given change in the rate of capacity utilization. These two observations together reveal that the higher the proportion of domestically produced intermediates (i.e., the higher ψ and Λ are), the steeper the NN curve is. If the EPZ is an enclave (low ψ and Λ), then for a given change in u_T, a lower excess demand for non-tradables is created. P_N has to rise by less, as a result, to restore equilibrium in the N-sector. If the EPZ is assimilated, on the other hand, a given increase in u_T creates a large excess demand for non-tradables. P_N has to rise by more to restore equilibrium. Put differently, the NN curve is relatively steep when the EPZ is assimilated and relatively flat when it is an enclave.

Consider next the TT-curve. The term Λ appears twice in the expression for EDT_P, the sign being negative in each case. The higher the share of domestic intermediate costs as a proportion of total costs, the greater the rise in EP_T^* when P_N rises, and therefore, the greater the decline in exports, and the smaller the substitution by N-caps towards the tradable good. Hence, the greater Λ is, the greater the excess supply created in the EPZ when P_N rises, and thus the more u_T has to fall in order to restore equilibrium. Thus, if the EPZ is assimilated, the TT-curve will be relatively flat, otherwise relatively steep. Also, if σ is high (price-elastic international demand), the TT-curve will be relatively flat, otherwise relative steep.

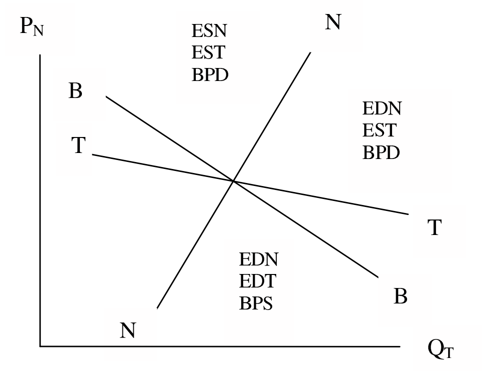
The slope of the BB-curve will be relatively steep (and negative) in the case of price-elastic international demand and relatively flat (and positive) otherwise. Furthermore, with inelastic international demand for EPZ products, BPS_p is smaller in magnitude if ψ and Λ approach zero. In other words, the smaller the proportion of domestic intermediates, the smaller the balance of payments surplus created as a result of a given real internal appreciation. BPS_u, on the other hand, is greater in absolute magnitude if ψ and Λ approach zero. In other words, the smaller the proportion of domestic intermediates, the greater the balance of payments deficit created as a result of a rise in capacity utilization. Thus, for inelastic international demand, the BB-curve will tend to be steeper if domestic intermediate use constitutes a small proportion of total intermediate use, i.e., if the EPZ is an enclave. In such a case, a given rise in capacity utilization creates a huge balance of payments deficit. A large real internal appreciation is required to remove the excess demand. An economy with an assimilated EPZ, on the other hand, does not experience a significant balance of payments deficit following a given rise in capacity utilization. The required real internal appreciation is therefore, correspondingly small. In sum, the BB curve tends to be relatively steep when the EPZ is an enclave and relatively flat otherwise. Taken together with the discussion of the NN curve, this implies that given price-inelastic international demand, the NN curve can plausibly be assumed to be steeper than the BB curve for an economy with an assimilated EPZ, and flatter for one with an enclave EPZ.

The relative slopes of the TT and BB curves when international demand for EPZ output is price-elastic are not immediately obvious, and require some consideration. Both the TT and BB curves tend to be relatively flat when the EPZ is assimilated and relatively steep when it is an enclave. Similarly both curves tend to be relatively flat when international demand for EPZ output is price-elastic, and relatively steep otherwise. However, under elastic international conditions, it can be seen that for small values of ψ and Λ, EDT_P tends to be very small in magnitude (and is indeed positive for values of these variables approaching zero). BPS_p, on the other hand, is still negative even if ψ and Λ approach zero, thanks to the imports of capital goods by N-caps. An increase in ψ and λ tend to make both EDT_p and BPS_p more negative, but this is likely to be proportionately less true for the latter because the imports of capital goods by N-caps is unaffected by a rise in the proportion of domestic intermediates. We therefore, assume that TT is steeper than BB when the EPZ is an enclave and flatter otherwise.

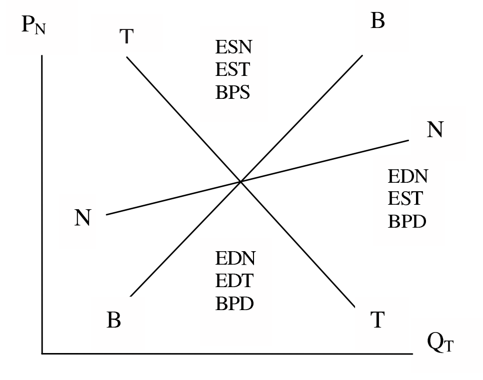
Figure 2 shows the effects of tax concessions for TNCs in all four cases (EE, EA, IE, and IA). The latter two cases are discussed in more detail in the main text of the paper.



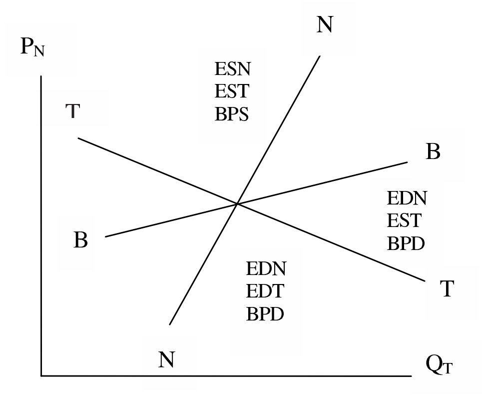
(a) Case EE: Elastic international demand, enclave EPZ



(b) Case EA: Elastic international demand, assimilated EPZ



(c) Case IE: Inelastic international demand, enclave EPZ



(d) Case IA: Inelastic international demand, assimilated EPZ

Figure 1: The NN, TT, and BB curves under alternative scenarios.

3 Comparative Statics for Cases EE and EA

3.1 Tax concessions for the TNCs

A reduction in t_T shifts income from the government to the TNCs, reducing consumption demand for the non-tradable good. The ensuing real internal depreciation translates into a decline in external terms of trade, boosting the international competitiveness of the EPZ, and as an indirect effect, raising the rate of capacity utilization. Since TNCs do not consume EPZ output there is no direct effect of a reduction in t_T on demand for EPZ output. Thus, both utilization and the real internal exchange rate are higher (i.e., the latter has depreciated) at the new equilibrium.[2] Turning to the balance of payments, by increasing the magnitude of after-tax TNC profits, a reduction in t_T has a negative direct impact (due to increased remittances and imports of capital goods). Higher utilization in the EPZ complements this negative effect. However, the indirect effect emanating from the N-sector, i.e., the real internal depreciation, works in the opposite direction by increasing the value of exports and the proportion of FDI financed out of foreign exchange resources. Thus, the balance of payments deteriorates *unless* the indirect effect via the real internal depreciation is really large. The latter case, which is only possible if the EPZ is an enclave (Case EE) so that the real internal depreciation only has a weak upward effect on utilization, could yield a real internal depreciation large enough for a surplus to exist at the new equilibrium. Thus, a balance of payments deficit is the unambiguous outcome for an assimilated EPZ and the likely one for an enclave EPZ.

Figures 2(a), 2(b) and 2(c) illustrate these effects. A fall in t_T has no effect on the TT curve, but shifts the NN curve rightwards and the BB curve leftwards. A balance of payments deficit results unless the NN curve shifts dramatically, and as a result, brings P_N down radically without significantly raising u_T, a scenario which is realizable (although unlikely) with an enclave EPZ (see Fig. 2(b)).

3.2 Tax concessions for owners of capital in the N-sector

A reduction in t_N shifts spending power from the government to N-caps. Since the government has a unitary marginal propensity to consume domestic output, an excess supply of this good is created, which leads to a real internal depreciation. The indirect effect of the depreciation on the EPZ is to boost utilization. A decline in their taxes increases N-caps' consumption of the tradable good, creating excess demand in the EPZ at a given level of exports. The rate of utilization will rise as a result, the indirect effect of which is to raise the price of the non-tradable good. Thus, while utilization is higher at the new equilibrium, the real internal exchange rate is higher (has depreciated) if the EPZ

[2] Note that while EP_T^* is lower, P_N is even lower at the new equilibrium.

is an enclave (so that the direct effect of the tax cuts on the N-sector dominates), and lower (has appreciated) if the EPZ is assimilated (so that the indirect effect of higher utilization dominates). Turning to the balance of payments, by increasing the magnitude of domestic (N-sector) profits, a reduction in t_N has a negative direct impact via greater import of capital goods. Higher utilization in the EPZ at the new equilibrium magnifies the deterioration. The effect of the real internal appreciation (where the EPZ is assimilated) is also negative while the effect of the real internal depreciation (where the EPZ is an enclave) is positive. Thus, the balance of payments deteriorates unless the real internal depreciation is really large. This relatively unlikely scenario is plausible only if the EPZ is an enclave so that an increase in utilization does not significantly raise P_N. Thus, a balance of payments deficit is the unambiguous outcome for an assimilated EPZ and the likely one for an enclave EPZ.

3.3 Wage suppression in the EPZ

The direct impact of a reduction in W_T on the N-sector results from the lower share of wages in the EPZ, lower TNC profits (and thus, government revenues) when measured in terms of the non-tradable good, and substitution by N-caps away from the non-tradable good. The ensuing real internal depreciation boosts the international competitiveness of the EPZ, and has the indirect effect of raising utilization. The direct effect of a decline in W_T on the EPZ is to increase international and domestic demand for its output, and to raise utilization as a result, which in turn has the indirect effect of putting upward pressure on the price of non-tradables. Utilization is, therefore, higher at the new equilibrium. The direct effect of a lower W_T on the balance of payments is favorable, thanks to the increase in international competitiveness, which is complemented by a decline in the value of capital goods imports. This positive direct effect is counteracted by the rise in utilization. The level of the new equilibrium real internal exchange rate therefore, makes one or the other result more likely. As mentioned above, the direct effect of lower wages is to depreciate it, while the indirect effect of higher utilization is to appreciate it. Assuming that the direct effect dominates in an enclave EPZ while the indirect effect dominates in an assimilated EPZ, the overall impact on the balance of payments is more likely to be positive if the EPZ is an enclave and negative otherwise.

3.4 Wage suppression in the N-sector

A reduction in $\bar{w}_N$ shifts demand for the non-tradable good from N-workers to N-caps and the government. Assuming that workers are the main source of demand for the non-tradable good,[3] a real internal depreciation is required to remove the resulting excess supply. The resulting increase in com-

[3]Since, unlike N-caps, they spend their entire income on the non-tradable good.

petitiveness has the indirect effect of raising utilization in the EPZ. Since N-caps' demand for tradable goods rises, the direct effect of a fall in $\bar{w}_N$ on the EPZ is to raise utilization. This puts upward pressure on the price of the non-tradable good through backward linkages. Turning to the balance of payments, the direct effect of a lower N-sector real wage is unfavorable, contrary to the case where EPZ wages fall. This is because an increase in the share of N-caps increases capital goods imports while having no direct bearing on external competitiveness.[4] The indirect effect of higher utilization is also negative. The overall consequence is a balance of payments deficit barring the unlikely scenario where the EPZ is an enclave, and the real internal depreciation resulting from the direct effect on the N-sector is large enough to offset the other direct and indirect negative effects.

3.5 A decline in the EPZ's use of domestic intermediate inputs

A reduction in ψ shifts demand away from N-sector output due to lower domestic intermediate input use, substitution towards EPZ output (due to its lower price), and lower government spending due to reduced tax revenues from TNCs.[5] A real internal depreciation is required to remove the resulting excess supply, which has the indirect effect of raising utilization in the EPZ. The direct effect of a fall in ψ on the EPZ is to lower the price of its output and thus raise domestic and international demand for it. Capacity utilization rises putting upward pressure on the price of the non-tradable good through backward linkages. Since a decline in ψ lowers the international price of EPZ output, the direct effect on the balance of payments is favorable. The indirect effect of higher utilization, on the other hand, is negative. The overall consequence is therefore, likely to be a balance of payments surplus if the EPZ is an enclave (so that the new equilibrium real exchange rate is higher) and a deficit if it is assimilated (so that the new equilibrium real exchange rate is lower).

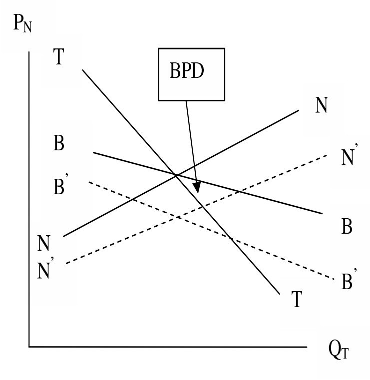
3.6 A nominal devaluation

A nominal devaluation shifts domestic demand towards the non-tradable good. A real internal appreciation is required to remove the resulting excess demand, which has the indirect effect of lowering utilization in the EPZ in the presence of backward linkages. The direct effect of a nominal devaluation on the EPZ is to lower the international price of its output and thus raise international demand for it. Capacity utilization rises putting upward pressure on the price of the non-tradable good through backward linkages. Thus, while the real internal exchange rate is unambiguously lower at the new equilibrium, utilization is higher if the EPZ is an enclave and lower otherwise. Since it increases

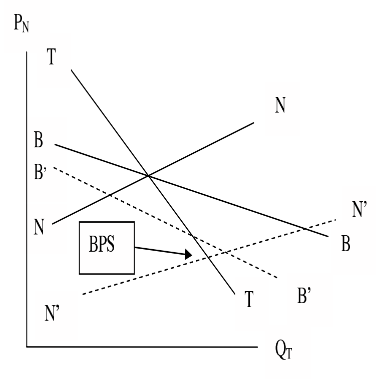
[4] This follows from the assumption that, unlike their EPZ counterparts, N-caps do not have any market power.

[5] The latter two impacts follow from the assumption that the use of domestic intermediates imposes extra costs on the TNCs.

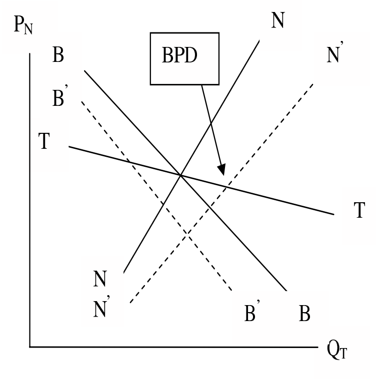
competitiveness, the direct effect of a nominal devaluation on the balance of payments is favorable. The real internal appreciation, however, has the opposite effect. The overall impact on the balance of payments is likely to be negative if the EPZ is an enclave (and hence sees utilization rise) and positive if it is assimilated (so that utilization declines).



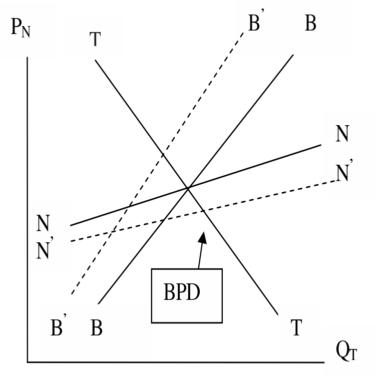
(a) Case EE-1



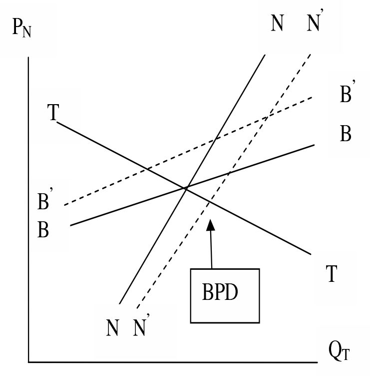
(b) Case EE-2



(c) Case EA



(d) Case IE



(e) Case IA

Figure 2: The effects of tax concessions for TNCs under alternative scenarios.

4 The Effects of Various Exogenous Shocks on FDI Inflows

For conciseness of expression, let us define some new terms:

$\Lambda = \frac{P_N \psi a_{ZT}}{e\varepsilon^*}$; $0 \leq \Lambda \leq 1$. The proportion of total costs arising from domestically produced intermediates.

$\Gamma = \frac{(P_N - EP_Z^*)\psi a_{ZT}}{e\varepsilon^*}$; $0 \leq \Gamma \leq 1$ assuming that $P_N > EP_Z^*$. Total costs incurred due to the use of domestic (as opposed to imported intermediates) expressed as a proportion of total unit variable costs.

$\Omega = \frac{W_T a_T + P_N \psi a_{ZT}}{e\varepsilon^*}$. Total labor and intermediate costs as a proportion of total unit variable costs.

$\Omega^* = \frac{P_Z^*(1-\psi)a_{ZT}}{\varepsilon^*}$. The proportion of total costs arising from imported intermediates.

Substituting the expression for profit share, i.e., $\Pi_{TC} = R_T EP_z^*/(TEP_T^*)$, into equation (11) yields:

$$I_{FDI} = \xi_1(1-t_T)e_{TZ}\Pi_{TC}Q_T \tag{16}$$

The direct effect of various exogenous shocks or policy measures on the magnitude of fresh FDI inflows can now be analyzed by partial differentiation.

$$\frac{\partial I_{FDI}}{\partial t_T} = -\xi_1 e_{TZ}\Pi_{TC}Q_T < 0$$

$$\frac{\partial I_{FDI}}{\partial t_N} = 0$$

$$\frac{\partial I_{FDI}}{\partial \bar{w}_N} = \frac{\partial I_{FDI}}{\partial a_N} = 0$$

$$\frac{\partial I_{FDI}}{\partial W_T} = \frac{\partial I_{FDI}}{\partial a_T} = \xi_1(1-t_T)\Pi_{TC}Q_T\frac{e_{TZ}}{W_T}(\Omega - \Lambda) > 0$$

where $\Omega = \frac{W_T a_T + P_N \psi a_{ZT}}{e\varepsilon^*}$ is the proportion of domestic-currency denominated costs.

$$\frac{\partial I_{FDI}}{\partial Y} = 0$$

$$\frac{\partial I_{FDI}}{\partial \psi} = \xi_1(1-t_T)\Pi_{TC}Q_T\frac{e_{TZ}}{\psi}\Gamma > 0$$

$$\frac{\partial I_{FDI}}{\partial a} = 0$$

$$\frac{\partial I_{FDI}}{\partial E} = -\xi_1(1 - t_T)\Pi_{TC} Q_T \frac{e_{TZ}}{E}\Omega < 0$$

Furthermore, the indirect effect originating from adjustments in the N-sector and the EPZ can be analyzed with the help of the following expressions:

$$\frac{\partial I_{FDI}}{\partial u_T} = \xi_1(1 - t_T)\Pi_{TC} K_T e_{TZ} > 0$$

$$\frac{\partial I_{FDI}}{\partial P_N} = \xi_1(1 - t_T)\Pi_{TC} Q_T \frac{e_{TZ}}{P_N}\Lambda > 0$$

These derivatives along with information about the direction of change in the price of non-tradables and the rate of capacity utilization in the EPZ resulting from various policy measures or exogenous shocks (as presented in Table 2 of the main text of the paper) help us establish the overall (direct plus indirect) impact of these events on the magnitude of FDI inflows. For example, Table 2 of the paper tells us that tax concessions for TNCs result in a higher rate of capacity utilization and a lower price of the non-tradable good. We know from the derivatives above that while the former increases total profits and thus the magnitude of incoming FDI, the latter has the opposite effect. Moreover, a look the derivatives above reveals that the direct effect of a decline in the TNC tax rate is to attract FDI inflows (due to higher after-tax profits). The overall impact is therefore, likely to be an increase in fresh FDI inflows into the economy.

5 A List of Key Derivatives and Their Signs

$$\frac{\partial \varepsilon^*}{\partial P_N} = \frac{\psi a_{ZT}}{E} > 0$$

$$\frac{\partial \varepsilon^*}{\partial \psi} = \frac{\varepsilon^*}{\psi}\Gamma > 0$$

$$\frac{\partial \varepsilon^*}{\partial W_T} = \frac{a_T}{E} > 0$$

$$\frac{\partial \varepsilon^*}{\partial E} = -\Omega\frac{\varepsilon^*}{E} < 0$$

$$\frac{\partial (EP_T^*)}{\partial \varepsilon^*} = \frac{EP_T^*}{\varepsilon^*}$$

$$\frac{\partial (EP_T^*)}{\partial P_N} = \Lambda e_{TN} > 0$$

$$\frac{\partial (EP_T^*)}{\partial P_N} < \frac{\partial (EP_T^*)}{\partial \varepsilon^*}$$

$$\frac{\partial (EP_T^*)}{\partial \psi} = \frac{EP_T^*}{\psi}\Gamma > 0$$

$$\frac{\partial (EP_T^*)}{\partial W_T} = a_T\frac{EP_T^*}{E\varepsilon^*} > 0$$

$$\frac{\partial (EP_T^*)}{\partial E} = \frac{EP_T^*}{E}[1-\Omega] > 0$$

$$\frac{\partial (P_T^*)}{\partial E} = -\frac{P_T^*}{E}\Omega < 0$$

$$\frac{\partial \alpha}{\partial P_N} = \frac{\alpha}{P_N}(1-\eta)[\Lambda - 1] > 0$$

$$\frac{\partial \alpha}{\partial \psi} = \frac{\alpha}{\psi}(1-\eta)\Gamma < 0$$

$$\frac{\partial \alpha}{\partial W_T} = (1-\eta)\frac{\alpha a_T}{\varepsilon^*} < 0$$

$$\frac{\partial \alpha}{\partial E} = (1-\eta)\frac{\alpha}{E}[1-\Omega] < 0$$

$$\frac{\partial \frac{\alpha}{e_{TN}}}{\partial E} = -\eta\frac{\frac{\alpha}{e_{TN}}}{E}[1-\Omega] < 0$$

$$\frac{\partial \frac{\alpha}{e_{TN}}}{\partial P_N} = \eta\frac{\frac{\alpha}{e_{TN}}}{P_N}[1-\Lambda] < 0$$

$$\frac{\partial \frac{\alpha}{e_{TN}}}{\partial W_T} = -\eta\frac{\frac{\alpha}{e_{TN}}}{W_T}[\Omega-\Lambda] < 0$$

$$\frac{\partial \frac{\alpha}{e_{TN}}}{\partial \psi} = -\eta \frac{\frac{\alpha}{e_{TN}}}{\psi} \Gamma < 0$$

$$\frac{\partial \alpha}{\partial a} = \frac{\alpha}{a} > 0$$

$$\frac{\partial \Pi_{NC}}{\partial P_N} = 0$$

$$\frac{\partial \Pi_{NC}}{\partial \psi} = 0$$

$$\frac{\partial \Pi_{NC}}{\partial \bar{w}_N} = -a_N$$

$$\frac{\partial \Pi_{NC}}{\partial a_N} = -\bar{w}_N$$

$$\frac{\partial \Pi_{NC}}{\partial E} = 0$$

$$\frac{\partial \Pi_{NW}}{\partial P_N} = 0$$

$$\frac{\partial \Pi_{NW}}{\partial \psi} = 0$$

$$\frac{\partial \Pi_{NW}}{\partial \bar{w}_N} = a_N$$

$$\frac{\partial \Pi_{NW}}{\partial a_N} = \bar{w}_N$$

$$\frac{\partial \Pi_{NW}}{\partial E} = 0$$

$$\left| \frac{\partial \Pi_{NC}}{\partial P_N} \right| = \left| \frac{\partial \Pi_{NW}}{\partial P_N} \right|$$

$$\frac{\partial \Pi_{TC}}{\partial P_N} = 0$$

$$\frac{\partial \Pi_{TC}}{\partial \tau} = \frac{1}{(1+\tau)^2} > 0$$

$$\frac{\partial \Pi_{TW}}{\partial P_N} = -\frac{\Pi_{TW}}{P_N} \Lambda < 0$$

$$\frac{\partial \Pi_{TW}}{\partial \psi} = -\frac{\Pi_{TW}}{\psi} \Gamma < 0$$

$$\frac{\partial \Pi_{TW}}{\partial W_T} = \frac{\Pi_{TW}}{W_T} [\Lambda + \Omega^*] > 0$$

$$\frac{\partial \Pi_{TW}}{\partial W_T} = \frac{\Pi_{TW}}{W_T} \left[\Lambda + \Omega^*\right] > 0$$

$$\frac{\partial \Pi_{TW}}{\partial E} = -\frac{\Pi_{TW}}{E}\left[1-\Omega\right] < 0$$

$$\frac{\partial e_{TZ}}{\partial P_N} = \frac{e_{TZ}}{P_N}\Lambda > 0$$

$$\frac{\partial e_{TZ}}{\partial \psi} = \frac{e_{TZ}}{\psi}\Gamma > 0$$

$$\frac{\partial e_{TZ}}{\partial W_T} = \frac{e_{TZ}}{W_T}(\Omega - \Lambda) < 0$$

$$\frac{\partial e_{TZ}}{\partial E} = -\frac{e_{TZ}}{E}\Omega < 0$$

$$\frac{\partial e_{ZN}}{\partial P_N} = -\frac{e_{ZN}}{P_N} < 0$$

$$\frac{\partial e_{ZN}}{\partial E} = \frac{e_{ZN}}{E} > 0$$

$$\frac{\partial e_{TN}}{\partial P_N} = -\frac{e_{TN}}{P_N}[1-\Lambda] < 0$$

$$\frac{\partial e_{TN}}{\partial \psi} = \frac{e_{TN}}{\psi}\Gamma > 0$$

$$\frac{\partial e_{TN}}{\partial W_T} = \frac{e_{TN}}{W_T}[\Omega - \Lambda] > 0$$

$$\frac{\partial e_{TN}}{\partial E} = \frac{e_{TN}}{E}[1-\Omega] > 0$$

$$\frac{\partial\left(\frac{1}{e_{TN}}\right)}{\partial P_N} = \frac{\frac{1}{e_{TN}}}{P_N}[1-\Lambda] > 0$$

$$\frac{\partial\left(\frac{1}{e_{TN}}\right)}{\partial \psi} = -\frac{\frac{1}{e_{TN}}}{\psi}\Gamma < 0$$

$$\frac{\partial\left(\frac{1}{e_{TN}}\right)}{\partial W_T} = -\frac{a_T\frac{1}{e_{TN}}}{\varepsilon^*} < 0$$

$$\frac{\partial\left(\frac{1}{e_{TN}}\right)}{\partial E} = -\frac{\frac{1}{e_{TN}}}{E}[1-\Omega] < 0$$

$$\frac{\partial\left(\frac{1}{e_{ZN}}\right)}{\partial P_N} = \frac{\frac{1}{e_{ZN}}}{P_N} > 0$$

$$\frac{\partial\left(\frac{1}{e_{ZN}}\right)}{\partial E} = -\frac{\frac{1}{e_{ZN}}}{E} > 0$$

$$\frac{\partial\left(\frac{1}{e_{TZ}}\right)}{\partial P_N} = -\frac{\frac{1}{e_{TZ}}}{P_N}\Lambda < 0$$

$$\frac{\partial\left(\frac{1}{e_{TZ}}\right)}{\partial \psi} = -\frac{\frac{1}{e_{TZ}}}{\psi}\Gamma < 0$$

$$\frac{\partial\left(\frac{1}{e_{TZ}}\right)}{\partial W_T} = -\frac{a_T\frac{1}{e_{TZ}}}{\varepsilon^*} < 0$$

$$\frac{\partial\left(\frac{1}{e_{TZ}}\right)}{\partial E} = \frac{\frac{1}{e_{TZ}}}{E}\Omega > 0$$

$$\frac{\partial X}{\partial P_N} = Y(1-\sigma)(\frac{(e_{TZ})^{1-\sigma}}{P_N}\Lambda < 0$$

$$\frac{\partial X}{\partial u_T} = 0$$

$$\frac{\partial X}{\partial \psi} = Y(1-\sigma)(e_{TZ})^{1-\sigma}\left[\frac{\Gamma}{\psi}\right]$$

$$\frac{\partial X}{\partial W_T} = -\sigma X\frac{\Omega-\Lambda}{W_T}$$

$$\frac{\partial X}{\partial E} = Y(1-\sigma)(e_{TZ})^{1-\sigma}\frac{\Omega}{E}$$

$$\frac{\partial \lambda}{\partial P_N} = (1-\sigma)\frac{\lambda}{P_N}\Lambda \gtreqless 0$$

$$\frac{\partial \lambda}{\partial u_T} = -\frac{\lambda}{u_T} < 0$$

$$\frac{\partial \lambda}{\partial \psi} = (1-\sigma)\frac{\lambda}{\psi}\Gamma \gtreqless 0$$

$$\frac{\partial \lambda}{\partial \mu} = \omega > 0$$

$$\frac{\partial \lambda}{\partial W_T} = (1-\sigma)(\Omega-\Lambda)\frac{\lambda}{W_T} \gtreqless 0$$

$$\frac{\partial \lambda}{\partial Y} = \frac{\lambda}{Y} > 0$$

$$\frac{\partial \lambda}{\partial E} = -(1-\sigma)\Omega\frac{\lambda}{E} \gtreqless 0$$

$$EDN_P = (1-t_N)c_N\alpha\frac{\Pi_{NC}}{P_N}(1-\eta)\left[1-\Lambda\right]\bar{Q}_N - \frac{\Pi_{TW}}{P_N}Q_Te_{TN} - \left[1-\Lambda\right]\frac{\Pi_{TC}}{P_N}t_TQ_Te_{TN} < 0$$

$$EDN_u = [\Pi_{TW} e_{TN} + \psi a_{ZT} + t_T \Pi_{TC} e_{TN}] K_T > 0$$

$$EDN_R = 0$$

$$EDN_\psi = - (1 - t_N) c_N \Pi_{NC} (1 - \eta) \alpha \bar{Q}_N \frac{\Gamma}{\psi} + a_{ZT} Q_T + t_T e_{TN} Q_T \Pi_{TC} \frac{\Gamma}{\psi} > 0$$

$$EDN_{t_T} = Q_T e_{TN} \Pi_{TC} > 0$$

$$EDN_{t_N} = [1 - (1 - \alpha) c_N] \Pi_{NC} \bar{Q}_N > 0$$

$$EDN_{\bar{v}} = a_N \bar{Q}_N [1 - (1 - t_N)(1 - \alpha) c_N - t_N] > 0$$

$$EDN_{a_N} = \bar{w}_N \bar{Q}_N [(1 - \beta) - (1 - t_N)(1 - \alpha) c_N - t_N] > 0$$

$$EDN_{W_T} = \frac{a_T}{P_N} Q_T + t_T \Pi_{TC} Q_T \frac{e_{TN}}{W_T} [\Omega - \Lambda] - (1 - t_N) c_N (1 - \eta) \alpha \frac{a_T}{\epsilon^*} > 0$$

$$EDN_Y = 0$$

$$EDN_{a_T} = \frac{W_T}{P_N} Q_T + t_T \Pi_{TC} \frac{e_{TN}}{a_T} [\Omega - \Lambda] - (1 - t_N) c_N (1 - \eta) \alpha \frac{W_T}{\epsilon^*} > 0$$

$$EDN_E = \frac{1 - \Omega}{E} \left[(1 - t_N) c_N (\eta - 1) \alpha \Pi_{NC} \bar{Q}_N + t_T Q_T \Pi_{TC} e_{TN} \right] > 0$$

$$EDN_a = -(1 - t_N) c_N \Pi_{NC} \bar{Q}_N \frac{\alpha}{a} < 0$$

$$EDT_P = \left[\eta (1 - t_N) \alpha c_N \frac{\Pi_{NC}}{E P_T^*} \right] [1 - \Lambda] \bar{Q}_N - \sigma X \frac{\Lambda}{P_N} \gtrless 0$$

$$EDT_u = -K_T < 0$$

$$EDT_R = 0$$

$$EDT_\psi = -\left[(1-t_N)c_N\bar{Q}_N\Pi_{NC}\eta\frac{\alpha}{e_{TN}} + \sigma X\right]\frac{\Gamma}{\psi} < 0$$

$$EDT_{t_T} = 0$$

$$EDT_{t_N} = -\frac{\alpha c_N \Pi_{NC}}{e_{TN}}\bar{Q}_N < 0$$

$$EDT_{\bar{v}} = -\frac{(1-t_N)\alpha c_N a_N \bar{Q}_N}{e_{TN}} < 0$$

$$EDT_{a_N} = \frac{\bar{w}_N\bar{Q}_N}{e_{TN}}\left[\beta - (1-t_N)\alpha c_N\right] < 0$$

$$EDT_{W_T} = - \frac{\Omega-\Lambda}{W_T}[(1-t_N)c_N\Pi_{NC}\eta\frac{\alpha}{e_{TN}}\bar{Q}_N + \sigma X] < 0$$

$$EDT_Y = (e_{TZ})^{-\sigma} > 0$$

$$EDT_{a_T} = - \frac{\Omega-\Lambda}{a_T}[(1-t_N)c_N\Pi_{NC}\eta\frac{\alpha}{e_{TN}}\bar{Q}_N + \sigma X] < 0$$

$$EDT_E = -(1-\Omega)(1-t_N)\eta c_N\Pi_{NC}\bar{Q}_N\frac{\alpha}{ee_{TN}} + \sigma X\frac{\Omega}{E} \gtrless 0$$

$$EDT_a = \frac{(1-t_N)c_N\Pi_{NC}\bar{Q}_N}{e_{TN}}\frac{\alpha}{a} > 0$$

$$\begin{aligned} BPS_P &= (1-\sigma)Xe_{TZ}\frac{\Lambda}{P_N} - (1-t_N)(1-c_N)\frac{\Pi_{NC}}{EP_Z^*}\bar{Q}_N \\ &- (1-t_T)\Pi_{TC}Q_Te_{TZ}\frac{\Lambda}{P_N}[1+(1-\lambda)\xi_1 - (1-\sigma)\lambda\xi_1] \gtrless 0 \end{aligned}$$

$$BPS_u = -(1-\psi)\zeta_t K_T - (1-t_T)\Pi_{TC}K_Te_{TZ}[1+\xi_1] < 0$$

$$BPS_R = -1$$

$$\begin{aligned} BPS_\psi &= (1-\sigma)Xe_{TZ}\frac{\Gamma}{\psi} + a_{ZT}Q_T \\ &- (1-t_T)\Pi_{TC}Q_Te_{TZ}\frac{\Gamma}{\psi}[1+(1-\lambda)\xi_1+\sigma\lambda\xi_1] \gtreqless 0 \end{aligned}$$

$$BPS_{t_T} = \Pi_{TC}Q_Te_{TZ}[1+(1-\lambda)\xi_1] > 0$$

$$BPS_{t_N} = \frac{(1-c_N)\Pi_{NC}}{e_{ZN}}\bar{Q}_N > 0$$

$$BPS_{\bar{v}} = \frac{a_N\bar{Q}_N}{e_{ZN}}\left[(1-t_N)(1-c_N)\right] > 0$$

$$BPS_{a_N} = \frac{\bar{w}_N\bar{Q}_N}{e_{TN}}\left[(1-t_N)(1-c_N)\right] > 0$$

$$BPS_{W_T} = e_{TZ}\frac{\Omega-\Lambda}{W_T}\left[(1-\sigma)X - (1-t_T)\Pi_{TC}Q_T[1+(1-\lambda)\xi_1+\sigma\lambda\xi_1]\right] \gtreqless 0$$

$$BPS_{a_T} = e_{TZ}\frac{\Omega-\Lambda}{a_T}\left[(1-\sigma)X - (1-t_T)\Pi_{TC}Q_T[1+(1-\lambda)\xi_1+\sigma\lambda\xi_1]\right] \gtreqless 0$$

$$BPS_Y = e_{TZ}^{1-\sigma}\left[1+(\xi_1(1-t_T)Q_T\Pi_{TC}e_{TZ}^{\sigma})\frac{\lambda}{Y}\right] > 0$$

$$\begin{aligned} BPS_E &= -(1-\sigma)Xe_{TZ}\frac{\Omega}{E} + (1-t_N)(1-c_N)\frac{\Pi_{NC}}{e_{ZN}}\bar{Q}_N \\ &+ (1-t_T)\Pi_{TC}Q_Te_{TZ}\frac{\Omega}{E}[1+(1-\lambda)\xi_1-(1-\sigma)\lambda\xi_1] \gtreqless 0 \end{aligned}$$

$$BPS_a = 0$$