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The Effects of Export-Oriented, FDI-Friendly Policies on the Balance of Payments in a Developing Economy: A General Equilibrium Investigation

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Working Paper

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by

Arslan Razmi

Working Paper 2005-03
Revised version, September 2006

UNIVERSITY OF MASSACHUSETTS AMHERST

The Effects of Export-Oriented, FDI-Friendly Policies on the Balance of Payments in a Developing Economy: A General Equilibrium Investigation

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Revised, September 2006

Abstract

Many developing countries have adopted investor-friendly policies in recent years in order to attract export-oriented foreign direct investment (FDI). The effects of these policies on the external accounts have been largely ignored. This paper endogenizes FDI inflows in a structuralist general equilibrium framework to contribute towards filling this gap. Our economy consists of: (i) a non-tradable goods sector and (ii) an export processing zone (EPZ) that hosts transnational corporations. The analysis finds that, contrary to widely-shared perceptions, the short-run effects of FDI-friendly policies on the balance of payments may frequently be negative due to the nature of both the investments and the policy measures. Moreover, balance of payments-related consequences of measures such as tax concessions and wage controls differ depending on: (i) which sector these are implemented in, (ii) the nature of international demand, and (iii) the extent of backward linkages between the EPZ and the domestic economy.

JEL Classifications: F21, F23, F41
Keywords: Foreign direct investment, balance of payments, export processing zones, structuralist macroeconomics, real exchange rates, income redistribution, terms of trade, transnational corporations.

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1 Background

While trade liberalization has been a notable feature of the post-Bretton Woods era, investment liberalization has produced transformations that some might term revolutionary in magnitude, if not in impact. For example, Stocker (2000, p. 111), while citing UNCTAD (1997), notes that international production now outweighs exports as the dominant mode of servicing foreign markets.[1] According to estimates, growth of global sales has exceeded that of exports of goods and services by a factor of 1.2 to 1.3 since 1987. The bulk of capital flows have been directed towards developed countries, with the least developed countries barely appearing on the radar screen. A look at data compiled by Kumar (2002) suggests that FDI flows to different parts of the world have varied over the years and that FDI flows may be less stable in the temporal dimension than is usually recognized.[2]

Regardless of its skewed distribution, FDI has come to represent a major proportion of total investment and exports in many developing countries. Woodward (2001) cited at least 8 developing countries in which FDI constitutes between 40% and 60% of all investment. The proportion of total manufactured exports sold by foreign affiliates was close to 50% in Malaysia and China in 1995 and 2001, respectively, and 80% in Hungary in 1999.[3]

Developing country efforts to attract FDI have been one of the highlights of economic policy in recent decades. Debates between proponents and opponents of FDI seem to have died down and 'whether or not TNCs [transnational corporations] are optimal instruments of development' has become a 'moot point' according to Evans (1998, p. 195), since 'no Third World country considers excluding them.' Liberalizing investment flows has often meant policy reforms designed to attract TNCs. We attempt to analyze the implications of these far-reaching developments for the external accounts of developing economies. Unlike most earlier studies, this paper focuses on export-oriented (rather than import-substituting) FDI. Moreover, unlike most previous studies, FDI inflows are endogenized and allowed to vary in response to changing economic conditions. Many *structuralist* trade models analyze North-South interactions. While the North typically gains or loses in the short-run through changes in its rate of capacity utilization, the South gains or loses via changes in its terms of trade. By shifting the spotlight to the balance of payments our model contributes to filling an important gap in the literature. Assumptions about the structure of the economy (for example, the higher import-intensity of capitalist consumption patterns) lead to interesting outcomes (for example, in

[1] UNCTAD (1997) also notes, however, that this does not apply to developing countries, where exports continue to dominate as the principal mode of delivering goods and services to the international markets.

[2] See also Fernandez-Arias and Hausmann (2000), and Bird and Rajan (2000).

[3] See Woodward (2001) and UNCTAD (2002b). Recent estimates for China have approached 60%.

instances where FDI-oriented policies affect income distribution). Furthermore, by explicitly studying the links between various policy measures, linkages between the EPZ and the domestic economy, and the nature of EPZ exports, our model analyzes the policy considerations that create trade-offs between various objectives such as employment, output, and the balance of payments.[4] The few studies that have explored balance of payments-related effects of FDI flows in the past have been based either on project-based considerations or on simulations, and ignore important interactions. This paper presents a significant departure by carrying out the analysis in a macroeconomic, general equilibrium framework, which allows us to take into account both direct and indirect (or second-order) effects. For example, while lower wages in the EPZ, by boosting competitiveness and the foreign exchange composition of (increased) FDI inflows, will have a positive direct impact on the balance of payments in the presence of price-elastic international demand, the indirect impacts resulting from real exchange rate changes and higher capacity utilization in the more import-intensive sector (i.e., the EPZ) may result in an overall balance of payments deficit.

Our enhanced framework yields several interesting results. For example, wage reduction or improvements in labor productivity are likely to have a favorable impact on the balance of payments only if: (i) these occur in the EPZ, (ii) the EPZ has weak backward linkages, and (iii) international demand for EPZ output is price-elastic. Furthermore, in the absence of conditions (ii) and (iii), a decline in domestic content requirements is likely to have a negative impact on the balance of payments. A nominal devaluation is likely to have a favorable impact on the balance of payments only if the EPZ has strong backward linkages to the rest of the economy. More broadly, most of the commonly used policy measures considered are likely to have a negative impact on the balance of payments, the impact generally being most unambiguously negative when the EPZ has few backward linkages to the rest of the economy and faces inelastic international demand for its products.

The organization of the remainder of this paper is as follows. Section 2 provides a brief overview of the relevant literature. Section 3 develops the model. Section 4 presents eight comparative statics exercises under alternative assumptions about the nature of international demand and the extent of backward linkages between the EPZ and the domestic sector. Section 5 concludes.

[4]It may be useful to emphasize here the short-run nature of our model. While the balance of payments may or may not constrain output growth in the long run, it is widely accepted that such constraints are important for developing countries in the short to medium run (see McCombie and Roberts, 2002, for a detailed discussion). For example, reduced access to foreign exchange can impede the purchase of imported intermediate and capital goods that are necessary for producing output in the short run, in addition to creating financial problems when a significant proportion of a country's debt is denominated in foreign currency. Furthermore, in a Keynesian world, the short-run decline in output and investment is exacerbated through multiplier effects. A devaluation undertaken in response could have contractionary effects through several demand- and supply-side channels (see Krugman and Taylor, 1978; Yiheyis, 2006, for example).

2 Literature Review

In the post-Bretton Woods era an exceedingly optimistic view of the beneficial effects of FDI inflows has prevailed. This enthusiasm for capital flows in general, and FDI in particular, has drawn strength from practical and theoretical developments. The debt crisis of the 1980s, the ensuing constricted access of developing countries to foreign capital, and perhaps, most importantly, the emergence of the so-called *Washington Consensus* increased the perceived attractiveness of FDI flows, which have been seen as largely non-debt creating. Moreover, concern about the risks associated with portfolio and short-term debt flows in the aftermath of the Asian crisis of 1997-8 has, if anything, resulted in a heightened perception of the benefits of FDI. Another possible explanation for the relative lack of debate on the balance of payments-related effects of FDI may lie in the shift from import substitution to export promotion as the dominant paradigm in developing countries, and the (in part consequent) increase in export-oriented FDI. On the theoretical front, several developments, such as the logic of neoclassical theory, the arrival of endogenous growth theories, and the incorporation of industrial organization theory have created new rationales for seeking FDI, and have served to push balance of payments-related concerns to the background. It should be noted however, that the microeconomic theory of international investment has evolved from simplistic assumptions of perfectly competitive behavior to explanations based on imperfect competition, industrial organization, and transaction cost considerations. A major implication has been the recognition that FDI flows are generally not caused by the same factors as other kinds of capital flows. As Caves (1996, p. 233) notes in the context of developing countries, 'the MNE is not primarily an arbitrager of capital, and risk-bearing considerations explain matching of local-currency assets and liabilities.' Thus, TNCs frequently borrow capital from host country capital markets. To the extent that net foreign exchange flows matter, this has implications for host developing countries with 'underdeveloped' financial markets.

Recent neglect of the effects of FDI flows on the external accounts of developing countries is surprising considering that 'Government's concerns with the balance of payments probably' had 'been the chief policy issue to bear on MNE's financial behavior, particularly in the 1960s, when almost all the industrial countries chose to maintain fixed exchange rates' (Caves, 1982, p.188). Focus has shifted to the effect of foreign investment on capital accumulation, economic growth, technological spillovers, and human capital development. Moreover, it is a widely held view among economists and policy makers that FDI improves the balance of payments of host countries directly through capital inflows and indirectly by increasing exports. This in turn loosens the foreign exchange constraint

in these countries. Past critics have argued that the consequences of FDI flows for the balance of payments are more ambiguous and may even be negative. Remittances of factor payments, increased import of inputs, and transfer pricing may offset other beneficial effects on the balance of payments.[5] Moreover, moves to weaken domestic content requirements are likely to increase the import intensity of TNC operations.[6] Some economists had foreseen other problems.[7] For example, worries about foreign exchange movements become even more relevant if the initial inflow of FDI has a low foreign exchange component. Although solved analytical models have been scarce,[8] a few earlier studies carried out numerical simulations or empirical analysis of the balance of payments effects of FDI on developing host countries, and found cause for concern.[9] Concerns of an earlier era, however, do not find much articulation today. Indeed, 'since around 1990, if there is a concern about FDI it is more likely to have been that the host economy is attracting *insufficient* foreign capital, in contrast to earlier concerns about an excessive foreign presence' (Athukorala and Hill, 2002).

A few relatively recent studies have attempted to address related issues, although again without working out a general equilibrium solution.[10] In a rare recent study of the macroeconomic consequences of FDI for the balance of payments, Jansen (1995) developed a calibrated model for Thailand. The output in the economy is demand-constrained. FDI influences both total demand (via total investment) and supply (via investment and the efficiency of investment). Jansen's simulations yielded several interesting results. A decline in FDI inflows reduces total demand and production capacity. Since the fall in supply is greater, the real exchange rate appreciates, negatively impacting exports. Furthermore, imports and investment income payments fall, resulting in an improvement in the current account balance. The sharp rise in export-oriented FDI inflows into Thailand after 1986 did have positive effects on private investment, growth, and exports. But the FDI-induced investments were highly import-intensive. Moreover, they led to higher investment income payments. The net result was that the deterioration in the current account more than offset the inflows of foreign capital.

In hindsight, the fact that the speculative run on the Thai Baht, and its subsequent collapse, started (but not necessarily *caused*) the chain of events that led to the Asian crisis of 1997-8 underlines the importance of Jansen's study. Thailand is a rather interesting case from our perspective because,

[5] See Lall and Streeten (1977) and Hood and Young (1979), for example. The results of these studies raised serious doubts about the balance of payments-related consequences of FDI for developing economies.

[6] See Blonigen and Wilson (1999) for a discussion of empirical studies that find significantly higher import intensities of inputs for transnational corporations.

[7] See Cable and Persaud (1987), for instance.

[8] Bos *et al.* (1974) is virtually the only exception known to this author but it excludes relative price effects.

[9] See Hood and Young (1979) for a study focusing on developing countries.

[10] See Fry (1993) and Woodward (2001).

according to Jansen (1995), in 1991 'the Board of Investment in Thailand issued promotion certificates for 534 projects; 304 of these planned to export 80-100 per cent of their output and a further 30 projects planned to export 30-79 per cent.' The projects invested in by foreign firms were found to be particularly export-oriented. Yet, on the eve of the Asian crisis, UNCTAD (1997, p. 92) noted that 'Indications are that FDI has played an important role in Thailand's large trade deficit, which constitutes the bulk of the current account deficit ... The sharp increase in the import to GDP ratio from 25 percent in 1985 to 40 percent in 1991 ... was largely due to a rise in import dependency, which was related to the growing role of FDI.' Thus, Jansen concluded that 'despite its export orientation, it [FDI] did little to improve the current account of the balance of payments (p. 206).'

As noted earlier, our analysis is focuses on EPZ-oriented FDI. EPZs have grown to become a widespread phenomenon, especially in the period since the debt crisis of the early 1980s. Grubel (1982, p. 40) gives the following definition of free trade zones, which are variants of EPZs:

> Free trade areas are zones separated from the surrounding host country's territory by fences or other barriers into which goods from abroad can be brought without quota restrictions or the payment of tariffs and excise taxes, and without being subjected to excise controls, and to the majority of statistical reporting requirements and regulations aimed at the protection of consumers ... Goods can be exported as freely as they can be imported.

In addition, many governments provide firms other sweeping incentives such as tax holidays, suppression of trade union activity, and accelerated depreciation allowances. As a result, the proportion of manufactured exports produced in EPZs is over 95% in Mauritius and over 55% in Malaysia, according to UNCTAD (2002b, p. 214). In the Dominican Republic, EPZ exports account for over 80% of total exports and almost all manufactured exports. EPZ activities are generally concentrated in low value-added traditional manufacturing within vertically-integrated firms.

3 A Short-Run Model

Our model focuses on a particular version of export-oriented vertical integration, which is the dominant form of FDI flows into developing countries today. Our stylized economy is perhaps best seen as a developing economy that has traditionally protected domestic producers from external (but not internal) competition under an import-substituting regime. Distributional conflicts have been kept under check through wage indexing. Export promotion is however, now being pursued through export processing zones.[11] The framework incorporates some of the standard structural asymmetries found in dual economy models, supplemented by assumptions designed to capture some of the specific features

[11] Indeed some observers have cited the inability of some governments to 'discipline' workers as a raison d'etre for resorting to the establishment of EPZs.

of TNC operations in developing countries. In doing so, it borrows from the approach pursued by previous studies in the structuralist tradition such as Blecker (1996) and Dutt (1998), in addition to drawing on the conceptual framework of the 'dependent economy' family of models.

Our economy produces two composite goods, the outputs of which are denoted by T and N, respectively. The tradable good is produced in the EPZ by TNCs, which are entirely owned by foreign investors. It is consumed both domestically and internationally (e.g., clothing, automobile parts, electronic appliances, etc.), and is produced with three inputs – capital, labor, and intermediate products – using fixed-coefficients technology for the latter two categories. The non-tradable good is produced in the domestic sector of the economy by firms owned by domestic capitalists (N-caps). This sector, which is 'sheltered' by domestic tariffs, transportation costs, and other barriers, produces both for domestic consumption and for intermediate use in the EPZ. The non-tradable good is produced using capital and labor. Import-substitution and specialization have proceeded to the point where the TNCs, while importing a substantial proportion of their intermediate inputs via intra-firm transactions or by sourcing through traditional suppliers, also purchase intermediate inputs from the domestic sector (perhaps due to domestic content requirements or the rules of origin mandated by many trade agreements such as the African Growth and Opportunity Act). Developing countries generally import most of their capital equipment. To accommodate this stylized fact, while keeping the analysis relatively simple, we assume that the economy imports all capital goods, irrespective of who owns the means of production. This set-up (with TNCs importing both capital goods and intermediates while domestic owners of capital import only the former) represents a simplification of the stylized fact that TNCs tend to import a greater proportion of their inputs compared with domestic firms.[12]

There are two groups of economic agents in each sector, workers and owners of capital. T-workers, sign contracts that fix their nominal wages in the short run. N-workers, on the other hand have a fixed real wage (or indexed nominal wages in terms of the consumption good) due to their relatively high bargaining power (perhaps due to the presence of labor unions). We assume away inter-sectoral capital flows and capital depreciation for simplicity. Moreover, the assumption that workers do not have the same degree of bargaining power in the two sectors implies that wages need not equalize across sectors.[13] Our assumptions imply the following accounting identities for the two sectors:[14]

[12]For example, in the Thai context, UNCTAD (1997, p. 92) noted that 'Foreign investment projects imported 90 per cent of all machinery and equipment and over 50 per cent of raw materials.' See also Woodward (2001). The exclusion of intermediate goods from production in the non-tradable sector simplifies the analysis without qualitatively altering it.

[13]Notice that we assume nothing about the *relative* magnitude of the two wages.

[14]See Appendix 1 for a consolidated list of brief variable definitions. A more detailed mathematical treatment in the form of an unpublished appendix is available from the author on request.

$$P_N N = w_N a_N N + r_N(eP_Z^*)K_N \tag{1}$$

$$eP_T^* T = w_T a_T T + r_T(eP_Z^*)K_T + eP_Z^* Z_T^* + P_N Z_T^N \tag{2}$$

where w_i, r_i, K_i, and a_i (i = N,T) denote the nominal wages, profit rates (expressed per unit of capital stock), total capital stocks, and labor coefficients in each sector, respectively, Z_T^* and Z_T^N are the amounts of imported and domestically produced intermediate inputs, respectively, used for production in the EPZ, e is the nominal exchange rate (the domestic currency price of foreign currency), and P_i (i = N, T, Z) are the prices of the non-tradable good, the tradable good and imported (capital and intermediate) goods, respectively. The latter two prices, which are set in units of the 'international' currency, are denoted by an additional '$*$.' P_Z^* also proxies for the international price level.[15]

The TNCs are assumed to operate (normally at less than full capacity) in an oligopolistic environment. The oligopolistic nature of TNC profits has been widely recognized in the literature since Hymer (1960), and has received much empirical support.[16] Their produce is assumed to fall under one of the following two categories: (i) consumer goods such as some electronic items, light manufactures, transportation equipment, textiles, etc. that involve labor-intensive technologies, and are generally considered to be 'low-tech.' The cross-price elasticity of demand for these products is assumed to be high although finite. (ii) an internationally differentiated 'brand,' or goods in the intermediate range of the global supply chain of manufactured products that play the role of complements to products that are higher in the hierarchy of technological sophistication. Examples are computer microchips that act as complements to production at higher stages of a vertically integrated chain or products which derive commercial success from their reputation for quality, after-sales service, reliability, and marketing. The international elasticity of substitution for such products may be low in the short-run thanks to product differentiation, contractual obligations, quality control-related issues, time-constrained production runs, and the sheer attraction of the brand name.[17] TNCs, which have a much wider international clientele, greater international mobility, greater flexibility in production, and can pass through more or less of input cost changes, set prices along Kaleckian lines, as a mark-up, τ over unit variable costs, ε^*. N-caps, with a limited audience and fewer marketing resources, have to rely much more on price

[15]The reader may have noticed that we have not introduced tariffs explicitly in our model. Non-tradables are also sometimes referred to as sheltered goods, as mentioned earlier, and their being non-tradable in our model may be interpreted as reflecting the assumption that they are heavily protected by quantitative restrictions and tariffs. Regarding the tradable goods, our neglect of tariffs can be justified on the grounds that many developing countries allow TNCs to import inputs for EPZ production virtually duty-free.

[16]For example, see Gerber (2001) and UNCTAD (2002a).

[17]See Blonigen and Wilson (1999) for the case of intermediate inputs.

adjustments. The N-sector is, therefore, assumed to have full capacity utilization and flexible prices for its output. This arrangement implies a dual adjustment process in which output adjusts in the EPZ while the price adjusts in the N-sector to clear the two goods markets. The mark-up pricing equation for the EPZ can be written as:[18]

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

Since we are analyzing footloose TNCs which produce mainly for export, these are assumed to set prices and consider variable costs in terms of the international currency. As suggested earlier, the TNCs purchase a proportion, ψ, of intermediates from domestic sources. The unit variable cost measured in terms of the international currency can, therefore, be expressed as:

$$\varepsilon^* = \frac{w_T a_T}{e} + P_Z^* \zeta_T + \left(\frac{P_N}{e} - P_Z^*\right)\psi\zeta_T \tag{4}$$

where ζ_T is the intermediate input coefficient. The third term on the right hand side represents the *extra* costs imposed by domestic content requirements or rules of origin. Notice that the proportion of domestic inputs used by the TNCs is assumed to be independent of relative prices. This assumption, although strong, is not unfounded.[19] The utilization rate, u_T, at any given moment in time, is less than or equal to the technologically possible maximum output-capital ratio in the EPZ. Consistent with our assumptions about the N-sector, firms here are assumed to produce at full capacity. Thus:

$$u_T = \frac{T}{K_T} \leq \frac{T_{max}}{K_T}; \quad \frac{N}{K_N} = u_N = \frac{N_{max}}{K_N} \tag{5}$$

where T_{max} and N_{max} are the maximum outputs given full utilization of resources, while u_N is the rate of capacity utilization in the N-sector. The price equations for the two sectors' products can be derived from eqs (1), (2), and (5), and written as:

$$P_N = w_N a_N + r_N e P_Z^* \frac{K_N}{N} \tag{6}$$

$$P_T^* = \frac{w_T a_T}{e} + r_T P_Z^* \frac{K_T}{T} + P_Z^* \zeta_T + \left(\frac{P_N}{e} - P_Z^*\right)\psi\zeta_T \tag{7}$$

While eqs (6) and (7) are derived from accounting identities, eq. (3) expresses a behavioral as-

[18] Note that we assume a fixed mark-up factor for simplicity. Allowing the mark-up to vary (with variable costs, for example), will complicate the analysis while leaving most of the results unchanged.

[19] For example, Lall (1993) commented that:

> What the evidence also suggests, however, is that, in an unconstrained environment (with free availability of imports) and weak local capabilities, and *especially where export-oriented activities are concerned*, TNCs prefer to retain linkages overseas, rather than undertake the extra cost of developing potential local suppliers (p. 19, italics added).

sumption. The wage share of total output in the N-sector can be expressed as:

$$\Omega_{NW} = \bar{v}_N a_N \tag{8}$$

where $\bar{v}_N$ denotes the (fixed) real wage in terms of the consumption good. Notice that our specification implies that N-workers have sufficient bargaining power to maintain their *share* of gross output when relative prices change. Total profits in the non-tradable sector are the residual left over after production costs have been incurred. The profit rate per unit of capital stock can be derived from eq. (1):

$$r_N = \Omega_{NC} \frac{N}{K_N} \frac{P_N}{eP_Z^*} \tag{9}$$

where Ω_{NC} is the share of profits in gross output in the N-sector. Next, the shares of profits and wages in gross EPZ output, Ω_{TC} and Ω_{TW}, respectively, can be derived from eqs (3), (4), (5), and (7):

$$\Omega_{TC} = \frac{\tau}{\tau + 1}; \quad \Omega_{TW} = (1 - \Omega_{TC})(1 - \Omega_{TZ}) \tag{10}$$

where Ω_{TZ} denotes intermediate input-related expenditures as a proportion of total input costs in the EPZ. Thus, Ω_{TW} and Ω_{TZ} are functions of P_N. Due to their relatively limited purchasing power, workers in either sector are assumed to consume non-tradables only. Moreover, wages are entirely consumed. N-caps, on the other hand, consume both goods, spending a variable proportion α of their nominal income on tradable goods.[20] The marginal propensity to consume out of profits is denoted by c_N. Profit income in the N-sector is taxed at a constant rate t_N. N-caps' nominal expenditure on the non-tradable good is, therefore, expressed as:

$$P_N C_{NNC} = (1 - t_N)(1 - \alpha) c_N r_N K_N e P_Z^* \tag{11a}$$

where C_{NNC} is the consumption of the non-tradable good by N-caps. Next, we assume that α is a function of the price of tradable goods relative to non-tradable goods:

$$\alpha = a \left(\frac{eP_T^*}{P_N} \right)^{1-\eta}; \qquad \eta > 1 \tag{11b}$$

where $1 - \eta$ is the 'share elasticity' with respect to the real 'internal' exchange rate, and a is a shift parameter. The assumption that the consumption behavior of N-caps is relatively sensitive to relative prices (i.e., $\eta > 1$) causes the *income* and *substitution* effects of relative price changes to affect expenditure on tradable goods in the same direction. The consumption functions of the other domestic agents can be specified as follows:

[20] This reflects the more 'cosmopolitan' consumption habits of N-caps and their greater demand for product variety. The parameter a may be interpreted as capturing 'demonstration effects' (Dutt, 1990). Substantial host country consumption of EPZ products is a well-recognized phenomenon, which may take place through legal and/or illegal means. See Zee *et al.* (2002) for example.

$$P_N C_{NiW} = w_i a_i i; \quad i = N, T \tag{12}$$

$$eP_T^* C_{TNC} = (1 - t_N)\alpha c_N r_N K_N e P_Z^* \tag{13}$$

where C_{ijk} denotes the consumption of good i (i = N, T) by group k (k = C, W) in sector j (j = N, T). The internationally differentiated nature of the tradable goods means that international demand for these has a finite elasticity, and that TNCs face a downward sloping demand curve for their exports.

$$E = Y\left(\frac{P_T^*}{P_Z^*}\right)^{-\sigma}; \qquad \sigma > 0 \tag{14}$$

where E denotes the volume of exports, Y denotes the level of world income or expenditures, and σ denotes the price elasticity of international demand. Note that the demand for the tradable goods is relatively price-elastic if $\sigma > 1$, and relatively price-inelastic if $\sigma < 1$. The public sector in the economy is assumed to consume only domestically produced non-tradables. The government obtains its revenues by taxing profits in both sectors. Furthermore, we assume a balanced budget for simplicity. Denoting the tax rate in the EPZ by t_T, we can express the balanced budget constraint as:[21]

$$P_N G_N = t_N r_N K_N e P_Z^* + t_T r_T K_T e P_Z^* \tag{15}$$

where G_N is real government consumption of non-tradable goods. Finally, we need to specify investment behavior. Regarding investment in the N-sector, we make the classical assumption that investment always equals the savings accumulated by owners of capital in that sector, and that the investment rate in the N-sector adjusts to maintain this relationship. Thus:

$$I_N = (1 - t_N)(1 - c_N)\Omega_{NC}\frac{P_N}{eP_Z^*}N \tag{16}$$

where I_N denotes real investment in the N-sector. Investment in the EPZ emerges from two sources: (i) retained profits of TNCs, I_R, and (ii) new FDI inflows, I_{FDI}. Thus, $I_T = I_R + I_{FDI}$, where I_T is the total new investment in the tradable sector. Retained profits are defined as the residual left over after repatriation and payment of taxes. Or:

$$I_R = (1 - t_T)(1 - \nu)\Omega_{TC} u_T K_T \frac{P_T^*}{P_Z^*} \tag{17}$$

where the proportion of (after-tax) profits repatriated, ν, is assumed to be given at a point in time, and reflects investor confidence in the economy and its financial system. Whether or not TNCs introduce

[21] Note that our formulation implies that taxes fall completely on 'rents.' Tax changes simply redistribute income between the government and the TNCs without directly affecting the price of EPZ output.

fresh FDI into the economy is specified to be a function of the nominal (after-tax) profits earned,[22] and an exogenous shift factor, ξ_0, that captures the effects of relevant factors such as investor fears engendered by currency crises or political instability. Thus,

$$I_{FDI} = \xi_0 + \xi_1(1 - t_T)R_T; \qquad \xi_1 > 0 \tag{18}$$

There are three relative prices in our model: the real 'internal' exchange rate, which captures the internal terms of trade of the economy, the real 'external' exchange rate, which captures the international cost competitiveness of the economy, and the 'terms of trade,' which apart from representing the ratio of the price of 'exportables' to that of 'importables' also indicates the international price competitiveness of TNCs based in the host country. Each can be defined, respectively, as follows:

$$q_{TN} = eP_T^*/P_N, \quad q_{ZN} = eP_Z^*/P_N, \quad q_{TZ} = q_{TN}/q_{ZN} = P_T^*/P_Z^* \tag{19}$$

The zero excess demand conditions for the two markets, and the IS condition can now be derived using eqs (1) - (19):

$$EDN = [(1 - t_N)(1 - \alpha)c_N + t_N]\,\Omega_{NC}N + \Omega_{NW}N + \Omega_{TW}q_{TN}u_TK_T + \psi\zeta_T^N u_TK_T + t_T\Omega_{TC}q_{TN}u_TK_T - N = 0 \tag{20}$$

$$EDT = (1 - t_N)\frac{\alpha c_N \Omega_{NC}}{q_{TN}}N + Yq_{TZ}^{-\sigma} - u_TK_T = 0 \tag{21}$$

$$Yq_{TZ}^{1-\sigma} - (1 - \psi)\zeta_T^* - (1 - t_N)r_NK_N(1 - c_N) - (1 - t_T)r_TK_T = 0 \tag{22}$$

Next, we consider the balance of payments (BP) equilibrium. The literature indicates that a major factor encouraging the raising of funds from within the host economy is the need to hedge against exchange rate changes. International investors may therefore, be expected to increase borrowing from host country sources if their sales to domestic consumers increase as a proportion of their total sales. We assume that a proportion λ of the funds constituting FDI are raised from outside the host economy, while the residual is raised from within it. The assumption that $\lambda < 1$ has ample empirical support.[23] In light of the discussion above, we assume that λ is a positive function of the ratio of exports to total TNC sales measured in international prices.[24] Substituting from eqs (5), (14) and (19) yields:

[22] This particular specification is aimed at simultaneously capturing the effects of the tax rate, the mark-up rate, the terms of trade, the rate of capacity utilization, and the size of the economy as expressed by the size of existing capital stock (the latter factor could be seen as representing an 'agglomeration effect').

[23] For example, Feldstein (1994) showed that only about 20% of the value of assets owned by US affiliates abroad is financed by international outflows of capital from the US, an additional 18% representing retained earnings linked to US investors, while the rest is financed locally. See also UNCTAD (1997).

[24] Note that this specification is not inconsistent with the 'imperfect capital markets' explanation for the relationship between the exchange rate and FDI developed by Froot and Stein (1991). Suppose international lenders (as opposed to lenders based in the host economy) provide the preferred source of external financing for TNCs. Then the higher

$$\lambda = \omega \left(\frac{Y(q_{TZ})^{1-\sigma}}{u_T K_T} \right) \tag{23}$$

The BP equilibrium condition can be derived from eqs (1) - (19) and (23), and expressed, in terms of the international price level as:[25]

$$\begin{aligned} BPS &= Y(q_{TZ})^{1-\sigma} - (1-\psi)\zeta_T u_T K_T - (1-t_T) u_T K_T q_{TZ} \Omega_{TC} - (1-t_N)(1-c_N)\frac{\Omega_{NC}}{q_{ZN}} N \\ &- (1-\lambda)[\xi_0 + \xi_1 (1-t_T) u_T K_T q_{TZ} \Omega_{TC}] - \Delta Res = 0 \end{aligned} \tag{24}$$

where BPS denotes a BP surplus and ΔRes represents the official reserves transactions due to changes in the sum of the current and capital accounts. Consistent with our assumption of a fixed exchange rate, we assume that official reserves vary endogenously to maintain external equilibrium.

To recap our discussion, we have derived a system of four equilibrium conditions – one each for zero excess demand in the two sectors, one for macroeconomic equilibrium in the goods market, and one for the balance of payments – in three variables, P_N, u_T, and ΔRes. P_N and u_T are assumed to adjust simultaneously to clear the markets for non-tradables and tradables, respectively. A resort to Walras's law allows us to exclude the IS equation from our analysis as superfluous.[26] Official reserve transactions then maintain the balance of payments equilibrium. Thus, eq. (24) is solved recursively for ΔRes after P_N and u_T are solved for simultaneously using eqs (20) and (21). Since the three equations constituting our system are non-linear, the model has to be solved by totally differentiating these equations with respect to the three endogenous variables. In abbreviated notation, $\mathbf{J}.\mathbf{u} = \chi$, where $\mathbf{J}$ is the Jacobian of the system consisting of eqs (20), (21), and (24), $\mathbf{u}$ is the vector of endogenous variables, and χ is the vector of exogenous variables or parameters.

Figure 1 presents the system graphically,[27] which can be analyzed under several alternative scenarios, depending on the assumptions made regarding the nature of EPZ production and output.[28] We focus on four for the sake of brevity. Table 1 provides a schematic summary.

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., Λ and ψ are relatively small.

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the proportion of the TNCs' sales denominated in the international currency, the lower the potential 'wealth effects' on the ability of the TNCs to fulfill their repayment obligations in the wake of nominal depreciation of the host country currency.

[25] Notice that we assume away international non-FDI capital flows and interest rate channels.

[26] It can be shown that eq. (22) can be derived from eqs (20) and (21).

[27] Since our analysis concerns the *local* properties of the system, we approximate the curves by straight lines.

[28] See the unpublished appendix, which is available on request, for a more detailed discussion of the derivation of the relative slopes of the various curves under alternative scenarios.

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., Λ and ψ are 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., Λ and ψ are relatively small.

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

The NN curve, which represents the locus of points along which the non-tradable goods market is in equilibrium, has a positive slope. An increase in the rate of utilization in the EPZ raises total EPZ wages, demand for domestic intermediates, and government revenues from taxes on TNCs, creating excess demand for the non-tradable good. The price of the non-tradable good will therefore, rise to restore equilibrium in the N-sector by squeezing out the excess demand through lower non-tradable good consumption and a decline in government spending due to the lower real value of tax revenues from TNCs. Furthermore, it can be shown that under reasonable assumptions, NN will be relatively flat if the EPZ is an enclave, and relatively steep if it is assimilated. The intuition is simple. The price of the non-tradable good will be relatively less sensitive to changes in capacity utilization in the EPZ if the latter exists as an isolated entity with few backward linkages.

The TT curve, which represents the locus of points along which the tradable goods market is in equilibrium, is negatively sloped. A real internal appreciation (rise in P_N) has contradictory effects on international and domestic demand for tradables. While the former falls due to the 'feedback' effects of higher input prices, the latter rises due to the increased purchasing power of N-caps. Assuming that international demand dominates, an excess supply results. The rate of capacity utilization will decline to remove the excess supply. It can be shown that under reasonable assumptions, TT will be relatively steep if the EPZ is an enclave, and relatively flat if it is assimilated. The intuition is simple. A higher proportion of domestic intermediates, as in the case of an assimilated EPZ, would ensure the creation of a relatively large excess demand for the tradable good following a real internal depreciation. A greater rise in utilization will therefore, be required to remove the excess demand. In other words, production in the EPZ will be relatively less sensitive to changes in the price of the non-tradable good if it exists as an isolated entity with few backward linkages. Furthermore, the TT curve will be relatively flat if international demand for the EPZ product is relatively price-elastic, and relatively steep otherwise.

The BB curve represents the locus of points along which the balance of payments is in equilibrium.

If international demand is price-elastic, a real internal appreciation creates a balance of payments deficit, mainly by reducing exports and the proportion of FDI financed out of foreign currency resources. However, if international demand is relatively price-inelastic, a real internal appreciation boosts the value of exports (even though the export volume falls) and the proportion of FDI being financed out of foreign currency resources. Imports by N-caps increase, but if the latter maintain a relatively small share of N-sector output and the initial export volume is high, then the overall consequence is a balance of payments surplus. We therefore assume that a real internal appreciation creates a deficit under cases EE and EA, and a surplus under cases IE and IA. In cases EE and EA, capacity utilization in the EPZ will have to decline to restore external equilibrium through lower imports of intermediates and capital goods, and a switch towards greater financing of FDI through foreign currency resources. In cases IE and IA, on the other hand, capacity utilization will have to rise to achieve the same end. An increase in the elasticity of international demand for EPZ products will tend to make the BB curve flatter. Furthermore, the BB curve will tend to be flatter if the EPZ is assimilated since in this case a rise in capacity utilization creates a relatively small balance of payments deficit (due to relatively low imports of intermediate inputs). The real exchange rate adjustment required to remove the deficit will also be correspondingly small.

Figure 1 illustrates these alternative scenarios. A few observations are in order regarding the *relative* slopes of the curves. Consider first the relative slopes of the TT and BB curves in Figs 1(a) and 1(b). As discussed earlier, TT and BB will be relatively flat when the EPZ is assimilated. However, under plausible assumptions,[29] BB is likely to be even flatter than TT when the EPZ is an enclave and steeper when it is an enclave. Consider next the relative slopes of the NN and BB curves in Figs 1(c) and 1(d). As mentioned earlier, NN is flatter when the EPZ is an enclave. The BB curve for the case when international demand is relatively inelastic, on the other hand, is flatter when the EPZ is assimilated. Thus, we assume that NN is flatter than BB in case IE and steeper in case IA.

4 Comparative Statics

In this section, we discuss eight types of policy changes and/or exogenous shocks. Table 2 summarizes the results of these and other parameter/policy changes under four alternative scenarios concerning the elasticity of international demand and the extent of backward linkages between the two sectors.

A few general observations about the structure of our model are worth highlighting before we begin our analysis. As mentioned above, our framework implies that adjustments take place in the N-sector

[29] See the unpublished appendix for more details.

and EPZ independent of the balance of payments. The latter then adjusts as a result through official reserve transactions. The linkages between the N-sector and the EPZ imply that each exogenous change that affects one of these sectors has an indirect (or second-order) effect on the other sector. For example, a rise in u_T (say as a result of higher international demand for EPZ products) will have the indirect effect of raising P_N, although the effect will be much greater if the EPZ is assimilated then if it is an enclave. Similarly, an increase in P_N will have the indirect effect of reducing u_T in the EPZ due to lower (internal and external) demand for its output, although the effect will be much greater for an assimilated EPZ. Finally, changes in both P_N and u_T that occur as a result of exogenous shocks will have indirect effects on the balance of payments, which are in addition to the direct impact of the shocks. For example, a higher P_N at the new equilibrium will have an indirect effect on the balance of payments (negative when international demand is elastic and positive otherwise). Similarly, a higher u_T at the new equilibrium will have an indirect adverse impact on the balance of payments.

4.1 Tax concessions for the TNCs

Consider one of the simplest cases. The level of taxation in a country is generally considered to be an important determinant of FDI inflows, especially in the case of the more footloose kind of vertical investments. As mentioned in Section 2, many governments have offered tax benefits to TNCs in an attempt to attract FDI. A recent study, Mutti and Grubert (2004), found that the tax sensitivity of TNCs is greater for: (i) investment geared towards export markets rather than the domestic market, and (ii) developing countries than developed countries, and that it seems to be increasing over time.[30] In the context of our model, it can be demonstrated that: $EDN_{t_T} > 0$, $EDT_{t_T} = 0$, $BPS_{t_T} > 0$, where the subscript indicates derivatives with respect to the indicated variable.

Cases EE, EA: 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.[31] 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

[30] Also, see UNCTAD (2001) and Nam and Radulesco (2004) for more detailed discussion of these issues.

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

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)).

Cases IE, IA: The effects of tax concessions are the same as in the elastic case except that the resulting real internal depreciation *reduces* the value of exports and the proportion of FDI financed out of foreign exchange resources. The net effect is, therefore, an unambiguous deterioration in the balance of payments at the new equilibrium. Figures 2(d) and 2(e) illustrate our discussion.

In summary, tax concessions for TNCs lead to a rise in capacity utilization, a real internal depreciation, and a deterioration of the balance of payments, the only unlikely exception being the case where the EPZ is an enclave and faces elastic international demand, in which case a huge real internal depreciation could possibly induce a surplus. Note that TNCs respond to tax cuts by increasing output (and, by implication, employment). It can be shown that FDI inflows are likely to increase as well.[32] The balance of payments-related effects, however, are less benign.

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

What if the government offers tax concessions to N-caps instead? It can be demonstrated that: $EDN_{t_N} > 0$, $EDT_{t_N} < 0$, $BPS_{t_N} > 0$. Thus, unlike tax concessions for TNCs, such concessions for N-caps do have a direct impact on *both* the N-sector and the EPZ.

Cases EE and EA: 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

[32]The unpublished appendix, available on request, contains a more detailed treatment of the effects on FDI.

utilization is higher at the new equilibrium, the real internal exchange rate is higher (has depreciated) if the EPZ 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.

Cases IE and IA: The effects of tax concessions for N-caps are the same as in the elastic case except that the real internal depreciation (where the EPZ is an enclave) has a negative impact on the balance of payments. The overall effect on the balance of payments is negative unless the indirect effect of rising utilization leads to a massive real internal appreciation. This latter scenario, although unlikely to be strong enough to result in a surplus, is nevertheless possible if the EPZ is assimilated so that rising utilization has a strong effect on P_N through backward linkages. Thus, a balance of payments deficit is the unambiguous outcome for an enclave EPZ and the likely one for an assimilated EPZ.

In summary, tax concessions for N-caps lead to a rise in capacity utilization, ambiguous effects on the real internal exchange rate, and a deterioration of the balance of payments, the only unlikely exceptions to the latter result being the cases where the EPZ is an enclave and faces elastic international demand, or the EPZ is assimilated and faces inelastic international demand.[33] Note that TNCs respond to tax cuts by increasing output even if they are not the intended direct beneficiaries of such cuts. It can be shown that FDI inflows are likely to increase as well, especially if the EPZ is assimilated.

4.3 Wage suppression in the EPZ

Many governments have revised their labor laws in recent years to attract foreign investors. Yet others have pursued other approaches to control or even lower domestic wage levels (by weakening unions for example).[34] This is not surprising perhaps given the rapid evolution of international production networks in recent decades, which would tend to make international demand for labor more wage-elastic. For example, estimates derived by Brainard and Riker (1997) suggest that while US parent

[33] In this sense, possible conditions for the creation of a balance of payments surplus under conditions of elastic and inelastic international demand are the mirror images of each other.

[34] See UNCTAD (2003) for a discussion of 'wage suppression' in recent decades in developing countries.

employment falls negligibly when wages in Mexico fall, affiliate employment in other developing countries such as Malaysia falls by 10 percent. This suggests that TNC employees in developing countries compete mainly with each other rather than with employees in the parent (mostly industrial) country. Suppose our economy attempts to enhance its attractiveness to international investors by weakening the bargaining power of EPZ workers. Suppose further that this results in a decline in the wage level in this sector. It can be demonstrated that: $EDN_{w_T} > 0$, $EDT_{w_T} < 0$, $BPS_{w_T} \gtreqless 0$.

Cases EE and EA: 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.

Cases IE and IA: The effects of wage repression are the same as in the elastic case except that: (i) due to the decline in the value of exports, the direct effect on the balance of payments is negative, and (ii) while the real internal depreciation in the presence of an enclave EPZ has a negative effect on the balance of payments, the real internal appreciation in the presence of an assimilated EPZ has the opposite impact. The overall effect on the balance of payments is therefore, unambiguously negative for an enclave EPZ, and likely so for an assimilated EPZ. The only scenario which could yield a different outcome is one where declining real wages have a very strong impact on utilization in an assimilated EPZ, which could then appreciate the real internal exchange rate – and by extension the value of exports – dramatically enough to result in a balance of payments surplus.

In summary, wage repression in the EPZ leads to a rise in capacity utilization, a real internal depreciation when the EPZ is an enclave and a real internal appreciation when it is not. The overall

impact on the balance of payments is unambiguously negative when the EPZ faces inelastic international demand and is an enclave, more likely to be positive when international demand is elastic and the EPZ is an enclave, and more likely to be negative when the EPZ is assimilated (irrespective of the elasticity of international demand). TNCs respond to wage cuts by increasing output. It can be shown that FDI inflows are likely to increase if the EPZ is assimilated and decline otherwise.

4.4 Wage suppression in the N-sector

What if the government tries to improve investment conditions by lowering wages in the N-sector instead? It can be demonstrated that: $EDN_{\bar{v}_N} > 0$, $EDT_{\bar{v}_N} < 0$, $BPS_{\bar{v}_N} > 0$.

Cases EE and EA: A reduction in $\bar{v}_N$ 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,[35] a real internal depreciation is required to remove the resulting excess supply. The resulting increase in competitiveness 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 $\bar{v}_N$ 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.[36] 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.
Cases IE and IA: The effects are largely similar to the elastic case except that the real internal depreciation resulting from the direct effect on the N-sector reduces the value of exports, while the real internal appreciation resulting from the indirect effect of higher utilization has the opposite effect. Overall the balance of payments deteriorates barring the relatively unlikely case where the EPZ is assimilated and the real internal appreciation resulting from higher capacity utilization is large enough to offset the other negative effects on the balance of payments.

In summary, wage repression in the N-sector leads to a rise in capacity utilization, a real internal depreciation when the EPZ is an enclave and a real internal appreciation when it is assimilated. The impact on the balance of payments is unambiguously negative when: (a) the EPZ is assimilated and faces elastic international demand conditions or,(b) the EPZ is an enclave and faces inelastic

[35] Since, unlike N-caps, they spend their entire income on the non-tradable good.
[36] This follows from the assumption that, unlike their EPZ counterparts, N-caps do not have any market power.

international demand conditions. Moreover, the impact is relatively likely to be negative in the other two cases as well. TNCs respond to wage cuts by increasing output. It can be shown that FDI inflows are likely to increase, especially if the EPZ is assimilated.

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

Suppose the EPZ reduces its use of domestically produced inputs (say due to relaxed domestic content or rules of origin requirements). It can be demonstrated that: $EDN_{\psi} > 0$, $EDT_{\psi} < 0$, $BPS_{\psi} \gtrless 0$.

Cases EE and EA: 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.[37] 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).

Cases IE and IA: The effects are largely similar to the elastic case except that: (a) the direct effect on the balance of payments is negative thanks to falling export prices in the presence of inelastic international demand, and (b) for an enclave EPZ, where the direct effect on the N-sector dominates, the resulting real internal depreciation has a negative impact on the balance of payments, whereas for an assimilated EPZ where the indirect effect of rising capacity utilization dominates, the resulting real internal appreciation has a favorable effect. Overall the balance of payments deteriorates barring the relatively unlikely case where the EPZ is assimilated and the real internal appreciation is large enough to offset the other negative effects on the balance of payments.

In summary, reduced use of domestic intermediates leads to a rise in capacity utilization, a real internal depreciation when the EPZ is an enclave and a real internal appreciation when it is not. The impact on the balance of payments is: (a) unambiguously negative when the EPZ is an enclave and faces inelastic international demand conditions, (b) likely to be favorable when the EPZ is an enclave and faces elastic international demand, and (c) likely to be unfavorable when the EPZ is assimilated.

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

TNCs respond to relaxed requirements by increasing output. It can be shown that FDI inflows are likely to increase when the EPZ is assimilated and decline otherwise.

4.6 A rise in labor productivity

A look at eqs (20), (21), and (24) reveals that the effects of a rise in labor productivity in the EPZ will be identical to that of a decline in the nominal wage in that sector. Similarly, a rise in labor productivity in the N-sector will have effects that are identical to those of a rise in the real wage in that sector. The reader is therefore, referred to the discussion in sections 4.3 and 4.4.

4.7 A nominal devaluation

Next, consider the effects of a nominal devaluation aimed at making the tradable goods sector more competitive. It can be demonstrated that: $EDN_e > 0$, $EDT_e > 0$, $BPS_e \gtreqless 0$.

Cases EE and EA: 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 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).

Cases IE and IA: The effects are different from the elastic case in that: (a) the direct effect on the balance of payments is negative due to falling export prices in the presence of inelastic international demand, and (b) the lower real internal exchange rate (appreciation) at the new equilibrium has a favorable effect on the balance of payments. Overall the balance of payments is likely to deteriorate if the EPZ is an enclave (so that utilization is higher at the new equilibrium), and likely to improve if the EPZ is assimilated (so that the higher imported intermediate price pulls down utilization).

In summary, a nominal devaluation leads to a real internal appreciation, greater utilization when the EPZ is an enclave and lower utilization when it is assimilated. The impact on the balance of payments is likely to be positive when the EPZ is assimilated and negative otherwise. TNCs may reduce or increase output following a nominal devaluation. It can be shown that FDI inflows are likely

to increase when the EPZ is an enclave and decline otherwise.

5 Discussion of Results and Concluding Remarks

Our main objective in this paper has been to explore the balance of payments-related effects of various policy choices frequently pursued by developing country policy makers in an attempt to attract export-oriented FDI. In doing so, we discovered that the consequences of such measures vary depending on several factors, of which we focused on the nature of the products produced in the EPZ and the extent of backward linkages between the EPZ and the domestic economy. More specifically, we divided our analysis into four cases: (i) an enclave EPZ facing relatively price-elastic international demand for its output, (ii) an assimilated EPZ facing relatively price-elastic international demand for its output, (iii) an enclave EPZ facing relatively price-inelastic international demand for its output, and (iv) an assimilated EPZ facing relatively price-inelastic international demand for its output.

The analysis produced some interesting results considering that FDI inflows are generally perceived as conducive to loosening external account constraints in developing countries. For example, wage suppression or gains in labor productivity in the EPZ are likely to result in unfavorable consequences for the balance of payments unless these occur in an enclave EPZ that faces price-elastic international demand. In the latter case, the real internal depreciation due to lower demand for non-tradables would have a favorable impact on the balance of payments while the upward pressure exerted on the price of domestic output by greater international demand would be minimal (due to weak backward linkages).

Wage suppression or gains in labor productivity in the non-tradable (domestic) sector lead to an unambiguously negative effect on the balance of payments (mainly due to the shift in income distribution towards the owners of capital who have a greater proclivity to spend on TNC or international products) unless either: (a) the EPZ is an enclave and faces elastic international demand, or (b) the EPZ is assimilated and faces inelastic international demand. In these cases, a favorable impact on the balance of payments is possible although for different reasons. In the first scenario, the real internal depreciation due to lower demand for domestic non-tradables could have a sufficiently strong impact to ensure a positive overall effect on the balance of payments, while the upward pressure exerted on the price of domestic output by greater international demand would be minimal (due to weak backward linkages). In the second scenario, lower real wages could increase domestic (N-caps') demand for EPZ output, and hence utilization in the EPZ, to an extent where the real internal appreciation caused by backward linkages could lead to an overall surplus. For reasons discussed in section 4.4, however, both these scenarios are unlikely to be realized. Generally a wage decline in the non-tradable sector

is relatively more likely to have a negative impact on the balance of payments than such a decline in the EPZ. This is mainly because, unlike the N-sector, the (limited) pricing power of firms in the EPZ means that a wage decline in that sector directly results in greater price competitiveness.

Tax concessions for either set of owners of capital raise utilization in the EPZ but are likely to have unfavorable consequences for the balance of payments, again mainly due to the shift in income distribution towards groups whose spending is more import-intensive. However, in the presence of strong backward linkages, and by raising utilization in the EPZ, tax concessions for domestic capitalists could result in a real internal appreciation large enough to lead to a surplus when international demand is price-inelastic. In this sense, tax concessions for domestic capitalists are somewhat less likely to have adverse consequences for the balance of payments than such concessions for TNCs.[38]

A relaxation of domestic content or rules of origin requirements, would generally lead to a deterioration of the balance of payments, except for the case where the EPZ is an enclave and faces elastic international demand. In the latter case, the increased competitiveness following from the assumption that cheaper intermediates are available from international markets implies that the direct effect on the balance of payments will be positive. Furthermore, the increase in capacity utilization would not significantly undermine the increase in international competitiveness since the effect on domestic non-tradable prices would be minimal in the absence of strong backward linkages.

Finally, the impact of a nominal devaluation on the balance of payments is ambiguous, and depends mainly on the extent of backward linkages. If the EPZ is an enclave the likely impact is negative, otherwise it is positive. To see why, consider first the case where international demand is price-elastic. Note that while a nominal devaluation results in domestic substitution away from EPZ output, it also leads to international substitution towards it. By increasing competitiveness in international terms, the direct effect of a nominal devaluation on the balance of payments is favorable. However, the real internal appreciation arising from domestic substitution towards non-tradable products offsets the direct positive effect. If the EPZ is assimilated, the resulting indirect effect in the form of lower utilization in the EPZ makes an overall surplus likely. If on the other hand, the EPZ is an enclave, the latter indirect effect is weak, making a deficit likely. Turning to the case where international demand is price-inelastic, the direct effect of the decline in the price of EPZ output (when measured in international terms) is adverse (due to lower *value* of exports.) The real internal appreciation due

[38]Notice that this result partly arises from the feature of our model that whereas a decline in t_N has a direct effect on the EPZ (due to domestic consumption of EPZ output), a decline in t_T does not (because owners of TNCs do not consume domestic non-tradables). While a real internal appreciation via a rise in capacity utilization is therefore, the outcome in the former case, a real internal depreciation is the outcome in the latter case.

to domestic substitution towards non-tradable products offsets this negative effect. Moreover, the resulting fall in demand for EPZ output and hence capacity utilization makes a balance of payments surplus more likely when the EPZ is assimilated. If the EPZ is an enclave, however, the fall in demand for EPZ output is likely to be small due to weak backward linkages (and hence a smaller upward pressure on the price of EPZ output), making a balance of payments deficit more likely.

Some of the interesting results originate from the empirically well-founded observation that TNCs typically operate in an oligopolistic environment, and often produce differentiated goods for which international demand may not be highly price elastic. Moreover, TNCs are not primarily arbitrageurs, and bringing foreign exchange-denominated finance to capital-scarce economies is not their major function. Taking into account aspects that are often overlooked such as differences in behavior, both between TNCs and domestic owners of capital and between the latter and workers yields interesting results. Furthermore, in the case of EPZs, where 'backward' linkages are often weak unless successfully imposed as a matter of policy,[39] the consequences are a matter of even greater concern, considering that any productivity gains derived from access to foreign know-how are likely to be small.

A few closing observations are in order. First, our analysis (as summarized in Table 2) indicates that TNCs *always* increase their output as a result of tax concessions or wage declines irrespective of which sector these occur in. This is consistent with the empirical finding that export-oriented TNCs are relatively more sensitive to tax and labor cost conditions. Second, to the extent that TNCs attract the more skilled workers on average, our analysis indicates that many of the measures pursued by developing country policy makers to attract foreign investment are likely to invite support not only from the direct beneficiaries (foreign investors), but also from the more skilled sections of the workforce (since these policy actions would generally lead to higher TNC employment, and in cases like tax benefits for TNCs, higher real TNC worker wages). Third, our study suffers from the limitation that, by implicitly assuming constant interest rates, it abstracts away from monetary considerations. Moreover, we have not accounted for possible pressures for factor price equalization and other effects that are better studied in a dynamic framework. While future extensions to this work will attempt to incorporate such dynamic considerations, our comparative statics analysis suggests that many of the measures pursued under the rubric of trade and investment liberalization are likely to have a negative impact on the balance of payments, at least in the short-run, and that developing country policy makers should carefully weigh the merits of various policy actions in light of the internal structures of their economies as well as the characteristics of the foreign investment that they are likely to attract.

[39] A matter of intervention that has been frowned upon in recent multilateral investment agreements.

Appendix 1: Brief description of variables

P_i: Price level in sector i (i = N, T).

e: Nominal exchange rate (domestic currency price of a unit of foreign currency).

q_{TN}: Real internal exchange rate (eP_T^*/P_N).

q_{ZN}: Real external exchange rate (eP_Z^*/P_N).

q_{TZ}: Terms of trade (eP_T^*/P_Z^*).

w_i: Nominal wage in sector i.

v_N: Real wage in sector i.

r_i: Rate of profit in sector i (i = N, T) per unit of capital stock.

R_T: Total TNC profits.

a_i: Unit labor coefficient in sector i (i = N, T).

N: Total output of non-tradables.

T: Total EPZ output.

K_i: Total capital stock in sector i (i = N, T).

Z_T^N: Total volume of domestic intermediate inputs used.

Z_T^*: Total volume of imported intermediate inputs used.

ζ_T: Intermediate input coefficient for EPZ production.

ψ: Domestic content requirement as a proportion of total intermediate input use.

τ: Mark-up over unit variable costs.

ϵ^*: Unit variable costs (measured in units of the international currency).

Ω_{ik}: Share of group k (k = C, W) in total i (i = N, T) sector income.

c_N: N-caps' marginal propensity to consume.

α: Share of tradables in N-caps' consumption.

η: Measure of N-caps' consumption sensitivity to change in relative prices.

C_{ijk}: Total consumption of good i (i = N, T) by group k (k = C, W) in sector j (j = N, T).

E: Total volume of exports.

Y: World real income.

σ: Price elasticity of international demand for EPZ exports.

G_N: Total real government spending.

I_N: Total real investment by domestic owners of capital.

I_R: Real retained profits invested by TNCs.

I_{FDI}: Fresh inflows of FDI in real terms.

ξ_1: TNC sensitivity to profit conditions in the EPZ.

ν: Proportion of (after-tax) profits repatriated by TNCs.

λ: Proportion of fresh FDI inflows financed out of foreign financial sources.

ΔRes: Official reserve transactions.

Λ: Share of domestically produced intermediates in total input costs.

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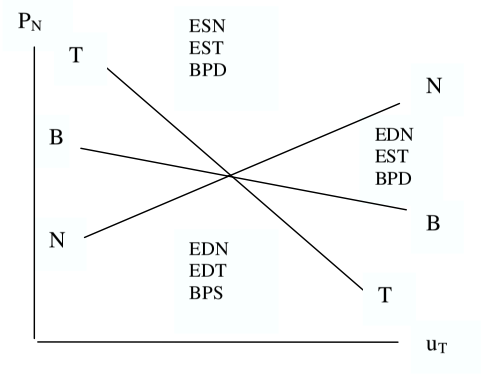
Table 1: The nature of EPZ output and production: a schematic presentation of the four scenarios considered.

		Nature of EPZ Links with the rest of the economy	
		Enclave (ψ and Λ relatively small)	Assimilated (ψ and Λ relatively large)
Nature of international demand for EPZ products	Elastic ($\sigma > 1$)	EE	EA
	Inelastic ($\sigma < 1$)	IE	IA

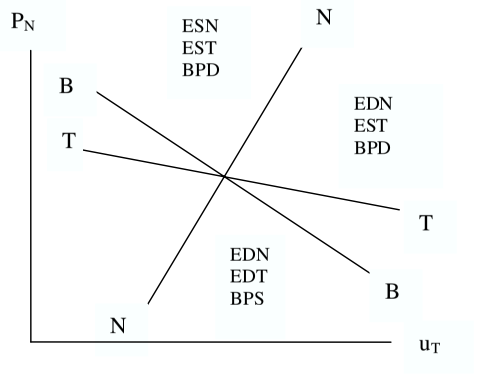
Table 2: Comparative statics.

	EE				EA				IE				IA			
	P_N	u_T	ΔRes	I_{FDI}	P_N	u_T	ΔRes	I_{FDI}	P_N	u_T	ΔRes	I_{FDI}	P_N	u_T	ΔRes	I_{FDI}
Decline in t_T	-	+	+/(-)	(+)/-	-	+	-	(+)/-	-	+	-	(+)/-	-	+	-	(+)/-
Decline in t_N	-	+	+/(-)	+/-	+	+	-	+	-	+	-	+/-	+	+	+/(-)	+
Decline in v_N	-	+	+/(-)	+/-	+	+	-	+	-	+	-	+/-	+	+	+/(-)	+
Decline in w_T	-	+	(+)/-	+/(-)	+	+	+/(-)	(+)/-	-	+	-	+/(-)	+	+	+/(-)	(+)/-
Decline in a_N	-	+	+/(-)	+/-	+	+	-	+	-	+	-	+/-	+	+	+/(-)	+
Decline in a_T	-	+	(+)/-	+/(-)	+	+	+/(-)	(+)/-	-	+	-	+/(-)	+	+	+/(-)	(+)/-
Decline in ψ	-	+	(+)/-	+/(-)	+	+	+/(-)	(+)/-	-	+	-	+/(-)	+	+	+/(-)	(+)/-
Rise in e	+	+	+/(-)	(+)/-	+	-	(+)/-	+/(-)	+	+	+/(-)	(+)/-	+	-	(+)/-	+/(-)

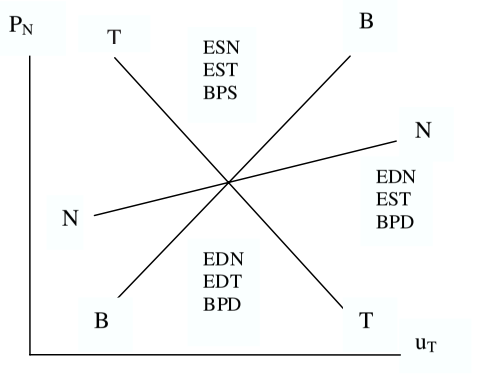
Notes: The terms in parentheses represent the more likely outcome. EE, EA, IE, and IA denote Elastic-Enclave, Elastic-Assimilated, Inelastic -Enclave, and Inelastic-Assimilated, respectively.



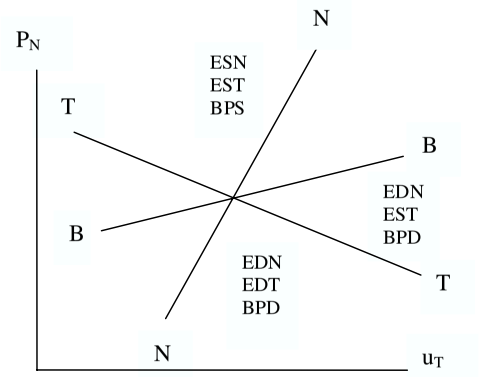
(a) Case EE: Elastic international demand, enclave EPZ



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

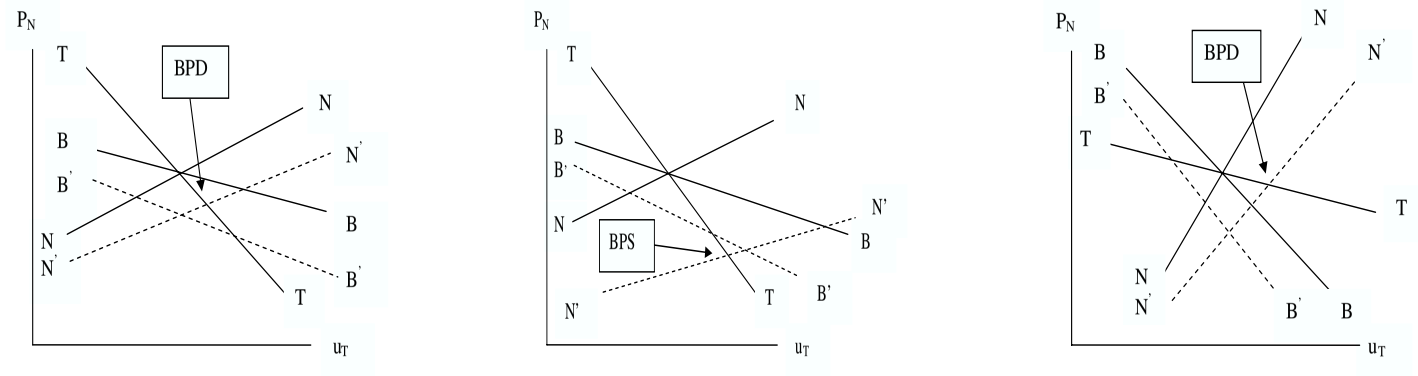


(c) Case IE: Inelastic international demand, enclave EPZ



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

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



(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.