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**Høgskolen i Østfold
Arbeidsrapport 2007:3**

Online-versjon (pdf)

Utgivelsessted: Halden

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Høgskolen i Østfold. Arbeidsrapport 2007:3

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ISBN: 978-82-7825-228-4

ISSN: 1503-6677

A Comment on the Optimal Structure of Export Processing Free Zones

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Abstract

This article comments on the industrial structure of developing countries' export processing free zones (EPZ). As developing countries are exposed to irrecoverable entry costs in international markets, the relationship between export supply and exchange rates has been shown to be persistent. In addition to hampering entry, the market entry costs thus complicate export supply responses. As the form of persistence varies between industry structures, market entry costs might also affect EPZ optimal industry structure. In order to create successful export promotion programs through EPZ, these differences should be taken into account. This paper comments on how different export industry structures create export revenues and backward linkages, two of the main objectives of EPZ.

JEL-Classifications: F 12, F 41.

Key words: Developing Countries, Export Processing Free Zones, Path-dependence in Foreign Trade.

1. INTRODUCTION

Over the last 30 years export processing free zones (EPZ) have become an important part of developing countries efforts' to stimulate exports of manufacturing goods. Starting in East Asia, export zones have spread throughout the developing world, including Sub Saharan Africa. EPZ are in the process of being introduced, or are already operating in at least six of the twelve members of SADC (Keet, 2006). Unfortunately however, among EPZ in SSA only a few have been successful (Kindua-Rutashobya, 2003).

Weak economic merits and, as first pointed out by Hamada (1974), theoretical arguments questioning the welfare effects of EPZ in general, make their popularity somewhat peculiar. However, the significant amounts of foreign direct investments (FDI) they generate have made them attractive for policy makers. Even so, research on EPZ provides for instance little guidance for policy makers on how to structure and manage EPZ, in addition to creating confusion as to the economic forces at work within a zone through use of disparate models (Devereux and Chen, 1995). Thus, there is a substantial research gap related to EPZ.

Apart from arguments related to the welfare effects of different factor intensities in EPZ sectors (Hamilton and Svensson, 1982), little research is related to optimal EPZ industry structure. Should one aim at a homogenous export industry structure, or should one allow for a heterogeneous structure? This paper provides a partial argument in relation to optimal industry structure, by taking the entry costs developing countries face in international markets into account. The importance of trade costs, and market entry costs more specifically, is discussed by Anderson and Wincoop (2004) and OECD (2003), and argued by Roberts and Tybout (1997, 1997b) to be of particular importance for developing countries. Thus, market entry costs should be taken into account when analyzing EPZ. This paper considers the effect of market entry costs on the optimal EPZ export industry structure by comparing the case with a diversified export industry structure to that of a homogenous industry structure along the lines of Borgersen (2006).

The optimal EPZ structure depends on the aim of establishing EPZ. Even though it is in fact not obvious why EPZ are established in the first place (Devereux and Chen, 1995), a much argued reason is to stabilize export revenues (Kindua-Rutashobya, 2003). As developing countries often are primary product exporters they suffer from highly volatile export revenues, hampering the possibility for long-term planning and development. In addition to stable

export revenues, EPZ are often, by stimulating technology transfers and FDI, intended as catalysts of change for the rest of the economy (Hamada, 1974). For FDI in particular a stable exchange rate is beneficial, making the impact of EPZ on exchange rates important for creating positive backward linkages. In fact, Chenery and Strouts (1996) argued in their classic development of gap analysis, that foreign exchange constraints were crucial for economic development. Hence, the optimal industry structure is here considered in relation to its impact on exchange rates and export revenues.

The structure of the paper is as follows. The next part provides some basic comments on EPZ. The third part is related to developing countries export structures and the market entry costs they face in international markets, the validity of the traditional theorems relating exports to exchange rates in presence of entry costs, and the link between EPZ and entry costs in international markets. The fourth and fifth part illustrate how EPZ with different industrial structures will have different export supply responses and different exchange rate effects, while the implications for EPZ objectives are commented on. The last part concludes.

2. EXPORT PROCESSING FREE ZONES

An EPZ is defined by Abbott (1997) as a “relatively small, geographically spread area within a country, where the purpose is to attract export-oriented industries by offering them especially favorable investment and trade conditions as compared with the remainder of the host country”. Muranda (2003) states that two different types of zones are common: the industrial park type, and the stand-alone EPZs. While stand-alone EPZs in general are set up to take advantage of local resource or location advantages, industrial parks are meant to stimulate exports through extensive industrial infrastructure, both physical and export oriented. In developing countries and SSA, EPZ history dates back to the mid 1960s and 1970s when the first EPZs were established in India and Mauritius (Kindua-Rutashobya, 2003). Today, a number of EPZ are established in developing countries following SAP, as the World Bank promotes EPZ as one of the instruments for integrating African economies into the global economy (Keet, 2006). Industrial parks seem to be most common, and also are the ones which are based on the most extensive policy interventions. The incentive package contains fiscal (tax ‘holidays’, exemption from customs duties on imported raw materials and all export taxes) as well as non-fiscal incentives (freedom to employ foreign nationals in technical or supervisory positions, unrestricted access to foreign ownership, guaranteed freedom to remove profits and equipments at any time, being served by a separate

administrative branch of the government) in addition to public infrastructure, as ports, roads, and airports, and are according to Warr (1987) some of the 'pull-factors' for manufacturing firms. EPZ have however shown mixed results. Both when it comes to aggregate export performance, backward linkages and intra-EPZ processing links EPZ show mixed results (UNCTAD, 1993). The variability in performance is due to a mix of heterogeneous incentives and different micro and macro economic characteristics (Johansson and Nilsson, 1997). Some of the EPZ results are summarized by Kindua-Rutashobya (2003), pinpointing in particular the mixed export supply responses and the weak backward linkages that follows EPZ in SSA.

UNCTAD (2003) separates between technology parks and EPZ as type of local clusters in developing countries, where the former comprises high-tech firms, and the latter mainly is intended to attract foreign firms. EPZ are claimed as characterized by a very low degree of coordination among firms within the cluster, often simple subcontracting relationships, and weak backward linkages, locking developing countries into a downward spiral due to low technology levels, low value added and low profitability. In addition, potential spin-offs from high gross export earnings are claimed undermined by the scarcity of net export earnings, but no assessments regarding industry structure or concentration is done.

EPZ are set up to help firms overcome problems related to exporting, both with respect to entry itself, but also with operating in international markets. With respect to the latter, subsidizing inputs and exemptions from export taxes are the dominating measures. When it comes to entry, the applied measures are broader. The barriers a firm has to overcome in order to enter foreign markets include both endogenous and exogenous factors (Jaensson *et al*, 2003: p. 27). In addition, they can be both internal as well as external (Borgersen, 2005). Thus, the policy measures have to be broader. The EPZ itself, by providing necessary export infrastructure as ports, airports and a public administration eager to assist exporting firms, are meant to assist in overcoming external and exogenous costs of entering international markets. In addition, EPZ is a type of policy instrument that allows for diffusion of ideas, technology and market knowledge among firms, something which potentially can help to overcome both the informal and endogenous factors hampering entry. Whether this diffusion of ideas is best stimulated by heterogeneous or homogenous industry structures is debatable, but the different industry structures certainly contain different export supply structures (Borgersen, 2006).

3. EXPORTS, IRRECOVERABLE MARKET ENTRY COSTS AND EPZ

Theoretically the traditional relationship between foreign trade flows and exchange rates is usually described by the Marshall-Lerner condition and the so-called ‘J-curve’ (Pitchford, 1995). While the former postulates long term relationships, the latter describes the short- to medium term trade effects following exchange rate shocks. Empirically however, the relationship between foreign trade flows and exchange rates seem somewhat dubious and export supply responses are in general not well understood (Roberts and Tybout, 1997b: p.v). For developing countries in particular, these conventional theoretical positions seem to be particularly misplaced. For instance, Roberts and Tybout (1997) showed how the existence of irrecoverable entry costs in international markets, and the non-linear relationship between export supply and exchange rates they produce, is important for developing countries export patterns. Borgersen (2007) analyses the impact of market entry costs on these theorems in depth, questioning their validity in general. Despite market entry costs, and the uncertainty regarding their effect on the relationship between exchange rates and exports, trade and exchange rate liberalization are key elements in the structural adjustment programs (SAP), dominating developing countries adaptation to international markets.

The non-linear relationship between export supply responses and exchange rates that follows the market entry costs suggest that a substantial gap remains before one understands the structures impacting on exports in developing countries. Still, some theoretical progress has been made. Göcke (2002) analysed the different concepts of hysteresis that are applied in economics and the forms of persistence (path-dependence) that follow. Amable *et al* (1995) introduced the crucial distinction between “weak” and “strong” hysteresis, where the latter comes about as aggregation strengthens persistence in the system (Göcke, 2002). This distinction is discussed by Borgersen (2006), relating it to the structure of export industries. However, in relation to EPZ the implications following different forms of persistence should be highlighted further, as EPZ in part are set up to overcome problems following the irrecoverable market entry costs, in particular related to weak national export infrastructure and costs being external to exporters, and costs related to lack of foreign market knowledge, internal costs for exporters.

The export hysteresis framework, where effects of past exchange rate values remain in current export volumes (Baldwin, 1988), postulates that enterprises are faced over and above other factors by sunk market entry costs, including costs of packaging, upgrading of product

quality, establishing export market channels and accumulating information on demand sources (Gumede, 2004: p. 380). Thus, market entry cost comprises external and internal, as well as formal and informal, costs. Market entry costs are part of the broader concept trade costs, defined as “all costs incurred in getting a good to a final user other than the marginal cost of producing the good itself: transport costs (both freight costs and time costs), policy barriers (tariffs and non-tariff barriers), information costs, contract enforcement costs, costs associated with the use of different currencies, legal and regulatory costs, and local distribution costs (wholesale and retail)” (Anderson and Wincoop, 2004, p.2). Trade costs will in general differ between industries and countries, but in general are tariffs the most pronounced formal entry cost in international markets. However, for developing countries informal market entry costs might be especially important as most of their firms are small (Harding *et al*, 2004), and in one way or another smaller firms bear higher costs for (market) information (Gumede, 2004: p. 387). The relevance of trade and market entry costs for African countries is evident in the studies by Bigsten *et al* (2004), Gumede (2004) and Söderbom and Teal (2000).

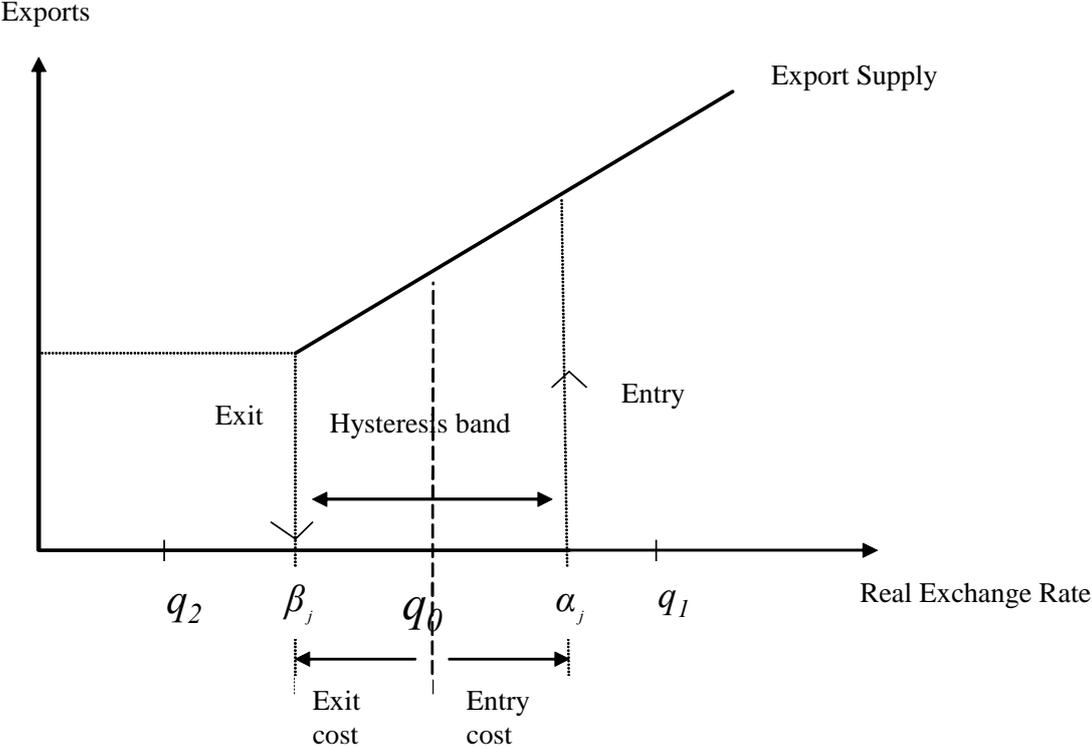
4. EPZ WITH A HOMOGENOUS INDUSTRIAL STRUCTURE

Let us start by considering the export supply response of an EPZ which consist of a number of firms from the same industry, facing the same market entry costs and with equal production technologies, providing a homogenous EPZ structure. The case with homogenous exporters and applying micro-economic non-linearity directly at the industry level, is also the approach of Baldwin (1988) and Baldwin and Krugman (1989). For homogenous exporters persistence is associated with non-continuous switching between multiple equilibriums whenever the real exchange rate passes the entry and exit thresholds, separating established exporters from new entrants in international markets. The distinction between the two types of firms is due to that new exporters have to incur an entry cost which established exporters already have incurred. The result, for instance, is the export supply curve for the EPZ as shown in Figure 1 of Baldwin and Krugman (1989). The export supply response and the exchange rate effects that follows such an EPZ structure provides interesting effects for both export revenues and the backward linkages through the exchange rate.

In Figure 1, EPZs export volume is a function of the real exchange rate, which is defined so that a higher value implies a weaker currency. According to Baldwin and Krugman, neither established exporters nor new entrants find it profitable to export when the exchange rate

(q_t) is below the exchange rate that triggers exit (β_j), i.e. for $(q_t < \beta_j)$. For these exchange rate values established exporters leave international markets. If the exchange rate exceeds the entry trigger (α_j), i.e. $(q_t > \alpha_j)$, both established exporters and new entrants, who now are willing to incur the market entry costs, are encouraged to export. For exchange rates between the triggers, which are referred to as the hysteresis band by Baldwin (1988), it is profitable for established exporters to keep exporting, but unprofitable for new entrants to begin exporting. For new entrants, this is because their entry costs are higher than the operating costs incurred by established exporters. Within the hysteresis band export *history* separates export market participation between otherwise identical firms in the same industry located within the EPZ.

Figure 1: Non-linear export supply and homogenous exporters



Let us consider how temporary exchange rate shocks affect exports in the case of a non-linear export supply structure. Consider the exchange rate process $(q_0 \rightarrow q_1)$ and back $(q_1 \rightarrow q_0)$ in Figure 1 and its effect on a firm that initially does not export. As the exchange rate moves above the entry trigger $(q_1 > \alpha_j)$, it becomes profitable for the firm to incur the entry costs and begin exporting. When the exchange rate falls back to its initial level (q_0) the firm however, does not stop exporting, as it already has incurred the entry costs. A corrective appreciation is now necessary to induce the firm to cease exporting, because the exchange rate that triggers exit is a lower one $(q_2 < \beta_j)$.

For an EPZ with a homogenous export industry structure the entry cost induced non-linearity can lead to persistent effects on export supply following large temporary shocks to the exchange rate. A smaller shock, that is one where the exchange rate always stays within the hysteresis band, does not produce the same export supply persistence. In effect, if the hysteresis band is situated around the equilibrium exchange rate, the export supply response is blurred by the entry cost effect, which counteracts the more conventional price effects for most normal exchange rate levels. Within the hysteresis band existing exporters determine the export supply response, as no entry occurs. Such an export supply response can explain some of the problems EPZ have had in stimulating exports. First of all, there is a severe entry cost effect. A massive depreciation is necessary to induce new firms to enter international markets. To stimulate exports by inducing new firms to enter international markets is difficult, and conditioned on both the ability to overcome operating losses in the short run by firms, and massive investments in export infrastructure by governments. However, once having entered exports is rather stable, as a corrective depreciation is necessary to induce established firms to exit. Once having entered international markets it is optimal for firms to keep exporting despite short term variations in profitability. Thus, manufacturing exports now becomes a source of stable export revenues. In addition, between these triggers exports provides a stable element in the country's exchange rate, while not affecting it at all for exchange rates below the entry trigger, and strengthening it continuously above the entry trigger.

5. EPZ WITH A DIVERSIFIED INDUSTRIAL STRUCTURE

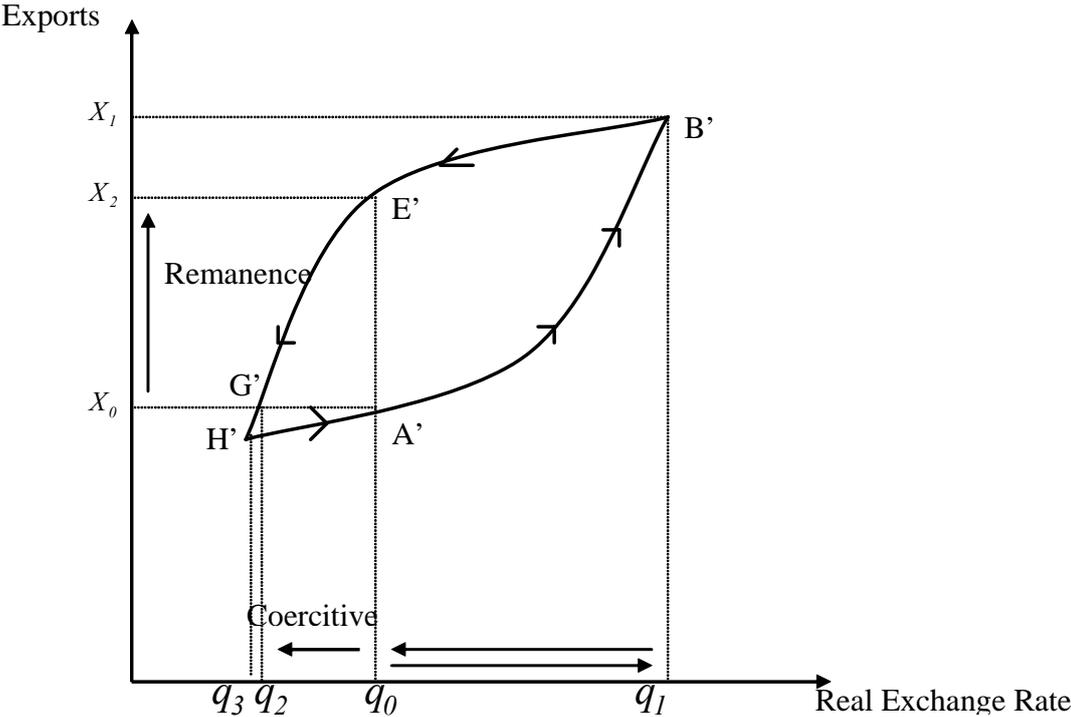
Consider instead the export supply response of an EPZ with a diversified export structure. Now the industrial park consists of firms from different industries, where both production technologies and the entry costs in international markets differ. The park is thus characterized by a number of different industries facing non-linearity at the microeconomic level, but where the exchange rates that trigger entry and exit differ. (For simplicity we assume that each industry consist of only one firm). Allowing for heterogeneous production technologies and market entry costs, and by applying the aggregation procedure of Amable *et al* (1995), a different export supply response is revealed as aggregation strengthens the microeconomic non-linearity, and "strong" hysteresis comes about.

Take for instance a situation where the production technologies of the different industries are uniformly distributed (over a set of possible technologies). Each individual exporter (industry) has an export supply curve as in Figure 1, but as both the size of market entry costs and operating costs differ between firms, the export supply curves of different industries are positioned uniformly at different exchange rate levels. This aggregate system contains the

memory of non-dominated extreme values of the variables, which drive adjustment at the micro level (Cross, 1994: p. 212). This implies that EPZ export is a function of the current exchange rate, as well as of the exchange rate history, where the latter is represented by the non-dominated extreme exchange rate values. Export supply persistence occurs continuously, every time the exchange rate changes direction and passes its prior extreme value. The result of this aggregation is a continuous EPZ export supply loop for the relationship between the real exchange rate and exports as in Borgersen (2006).

The loop is shown in Figure 2, and is situated between the local extreme values (q_3) and (q_1). We consider the effect on aggregate exports of the exchange rate shock ($q_0 \rightarrow q_1$) and back ($q_1 \rightarrow q_0$). The initial impulse ($q_0 \rightarrow q_1$) increases exports ($X_0 \rightarrow X_1$), as some new firms continuously incur the entry costs and start to export. The movement is sketched from (A') to (B'). A reversal of the exchange rate ($q_1 \rightarrow q_0$) reduces exports ($X_1 \rightarrow X_2$), but not to its initial level as ($X_2 > X_0$). The difference in export volumes comes about as the process now follows the branch ($B'H'$), and the movement is given from (B') to (E'). As the export supply loop is multi-branched between (q_1) and (q_3), there is no unique relationship between exports and the exchange rate, as depreciations and appreciations create movements along different branches.

Figure 2: Heterogeneous exporters and the continuous export loop



There is thus a persistent “*remanence effect*” ($X_2 - X_0$) on exports, even from a temporary exchange rate shock. Exchange rate shocks have persistent effects on EPZs export supply whenever the shock results in a local extreme value for the exchange rate, such as (q_1) in our case. The size of the shocks does not matter, as both small and large exchange rate shocks can induce local extreme values, depending upon their initial starting point.

The asymmetric entry and exit responses occur continuously for all non-dominated exchange rate values, because the production technologies of EPZs export industries are uniformly distributed. In order for exports to fall back to their initial volume (X_0) the exchange rate must appreciate further, to ($q_2 < q_0$). At (q_2) the number of industries who will find it profitable to leave international markets will equal the number that initially found it profitable to enter. However, the industries that leave might not be the same as those that entered. The difference between the exchange rates that reduces the EPZs export volume to its initial volume, represents the “*coercitive force*”, that is ($q_2 - q_0$). Without the “*coercitive force*” there is persistence in EPZs export supply response, even from a temporary exchange rate shock. The “*coercitive force*” is always in the opposite direction as the initial shock. A temporary depreciation (appreciation) must be followed by a later appreciation (depreciation) for exports to fall (rise) back to its initial volume.

A diversified EPZ industry structure gives a continuous export supply response, every time the exchange rate passes a local extreme value. Thus, it is not necessary with a massive exchange rate shock to stimulate entry. To get started with manufacturing exports, such an industrial EPZ structure seems to be preferable. However, as the EPZs export supply is completely idiosyncratic, the aggregate export response and the export revenues following EPZ are less stable, of course also providing idiosyncratic exchange rate effect, both of which stability was part of the primary EPZ objective in the first place.

6. CONCLUSIONS AND IMPLICATIONS

Today, stimulating exports is an important part of developing countries’ economic policies, and for many countries EPZ is an integral part of these policy measures. However, with weak export responses and perverse backward linkages, most EPZ are unsuccessful. The weak empirical record is followed by rather blurry theoretical positions regarding the relationship between export dynamics and exchange rates when countries face irrecoverable entry costs in international markets, and in fact the welfare effects of exporting in general. In effect, taking

the market entry costs, and their different export supply responses into account, can significantly improve the understanding also of EPZ, which has been inconclusive until now. This paper intends to increase the understanding of EPZ, by analyzing how export supply responses vary between EPZ industry structures.

In this paper it is commented that when EPZ have a homogenous export industry structure large shocks to the exchange rate can have different effects on export than smaller shocks. On the other hand, when EPZ have a more diversified industry structure its export supply response can be characterized by continuous persistence following every non-dominated exchange rate, irrespective of the size of the shock. Comparing an EPZ with a homogenous export industry structure to that of a diversified structure shows how export supply responses, and the exchange rate effect that follow, will differ between industry structures. Also, with a homogenous structure the initial export effect might come slowly, as an aggregate trigger has to be passed for exports to be profitable. However, once having entered the export response is stable, as a corrective depreciation is necessary for the industry to cease exporting. This entry effect provides a stabilising element in the exchange rate, inducing positive backward linkages to the rest of the economy. On the other hand, a diversified EPZ structure stimulates export supply gradually and creates political gains earlier, as passing of every local extreme exchange rate value will have persistent effects.

Research on industrial EPZ structure is limited, but based on studies of EPZ in India, Sri Lanka and Bangladesh, Aggarwal (2005) claims that it is optimal for EPZ to specialize as industrial clusters of specific products. This homogenous industrial structure will make the transformation into horizontally-integrated industrial clusters smoother. At the same time Kaplinsky (1993) and UNCTAD (1999) both argue that EPZ in general seems to be concentrated in manufacturing industries where value-added is low, and with limited concentration. That is, the industrial structure is rather heterogeneous. In addition, Kaplinsky argues in accordance with a diversified industrial structure, related to instable EPZ production responses in case of exchange rate shocks. That is, EPZ are hit by continuous exit effects when exchange rate shocks are negative, instead of the entry effects following the positive shocks discussed above, and, as claimed by UNCTAD (1998) locked into a downward spiral. In fact, export supply responses following diversified EPZ structures are completely idiosyncratic, both with respect to industrial structure and time period. An idiosyncratic export supply response will also induce the same type of exchange rate process, complicating

long-term planning, and create negative backward linkages for the rest of the economy. Thus, weak economic merits can in part be a result of industrial EPZ structures.

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