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De-Industrialisation and Entrepreneurship under Monopolistic Competition

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Abstract

This paper offers a new mechanism to explain de-industrialisation in response to a price increase of the manufactured good. In our trade model, one sector (agriculture) is perfectly competitive while the other (manufacturing) is monopolistically competitive. Both industries use skilled and unskilled labour as inputs. Entry into manufacturing requires a fixed cost in terms of skilled labour only. A rise in the market price for the differentiated goods raises both marginal revenue and the price of skilled labour, which affects the marginal cost of production and the entry cost. When short-run profits increase so that new manufacturing firms enter, fewer skilled workers are available for production purposes. This, in turn, may then lead to a decline in total manufacturing output. Our theoretical mechanism is jointly consistent with recent empirical observations on pre-mature de-industrialization characterizing several Latin American and Asian countries, and productive diversification as observed in various developing economies.

Keywords: Entrepreneurship, monopolistic competition, de-industrialisation

JEL-class.: F12, D43

*) Professor Albert Schweinberger passed away in August 2013. This is the last paper he has written in his long and outstanding career, and it is dedicated to the memory of this great scholar and friend! We are very grateful to Kristian Behrens, V.Bhaskar, Sajal Lahiri, and especially Roy Ruffin for various suggestions on an earlier draft of this paper. We are also indebted to seminar participants in Rotterdam and Shanghai. Suedekum acknowledges financial support by the German National Science Foundation (DFG), grant number SU 413/2-1. All correspondence related to this paper should be addressed to: Jens Suedekum, Heinrich-Heine-University Düsseldorf, Düsseldorf Institute for Competition Economics (DICE), Universitätsstrasse 1, 40225 Düsseldorf, Germany. Email: suedekum@dice.hhu.de

1). Introduction

De-industrialisation, defined either as a fall in the share of industrial output in GDP or the share of industrial employment in total employment, and its short- and long-run term effects on growth and development are time honoured topics of a huge empirical and theoretical research effort since the seminal contributions by Kaldor (1966, 1967). Recently the topic has acquired a new dimension because some economists have focussed in their empirical work on "premature de-industrialisation", i.e., de-industrialisation at a much lower level of per capita income than observed historically in today's advanced economies (see Dasgupta and Singh 2007). A structural tendency of premature de-industrialisation appears to be evident in a number of countries in Latin America in the 1980's and 90's. In Asian countries, de-industrialisation occurs in mature economies such as Hongkong or Taipei, undoubtedly owing to a relocation of production to mainland China. On the other hand, there exists also some prima facie evidence that premature de-industrialisation exists in less mature Asian countries such as the Philippines, Indonesia or India.[1]

What are the main causes of de-industrialisation? To shed some light on these highly important issues, we adopt a perspective based on a two-sector general equilibrium model of an open economy with monopolistic competition. It seems to us that, the many interesting results of the received literature on the causes and consequences of de-industrialisation notwithstanding, our approach yields a number of novel insights. This is mainly due to the fact, that monopolistic competition models allow us to capture in a relatively simple framework the interaction between the number of firms, firm size, and total industry output.

We develop a simple 2×2 general equilibrium model of a small open economy with two factors (skilled and unskilled labour) and two industries, one with perfect competition ("agriculture") and one with monopolistic competition ("manufacturing"). The basic tenet of our paper is that the setting up of new manufacturing firms is an *entrepreneurial* activity, which requires special abilities. Only skilled labour is endowed with such abilities. In our model, both industries use both

[1] Recent empirical contributions on these issues include Imbs and Wacziarg (2003), Debande (2006), Rodrik (2007) or Felipe and Estrada (2008).

factors as inputs in production, but in manufacturing, there is also a fixed input requirement of skilled workers per firm to act as entrepreneurs. This setup cost gives rise to non-homotheticity, and the industry's overall factor intensity depends on the scale of manufacturing production.

Now consider an increase in the world relative price of manufacturing goods, which represents an improvement in the terms of trade if the country is a net exporter of manufacturing varieties. According to the received literature, this should lead to an expansion of total industrial output. Yet, due to changes in profits in the short-run equilibrium, there may occur also an endogenous change in the number of firms. If the price increase has a sufficiently strong positive effect on profits, additional firms enter the industry, i.e., it induces *entrepreneurial* activity.

Due to non-homothetic production, this implies that more of the skilled labour must be used as a fixed input and, therefore, the effective endowment of skilled labour available for production purposes decreases. This decrease is the driving force behind the possible de-industrialisation result in our model. However, the price increase also entails the well-known positive output price effect working into the opposite direction. Which effect dominates depends, inter alia, on the relative sizes of three effects: i) a novel generalised Rybczynski effect which captures the allocation of skilled labour to the setting up of firms relative to production, ii) the change in firms' profit margins (mark-ups) relative to the induced change in factor prices, as captured by a concept called "marginal profitability of setting up manufacturing firms" (MPS) below, and iii) the magnitude of the standard short-run output effect (SOE) that is well-known from the received literature.

Previewing our main theoretical proposition, we show that the increase in the relative price of the manufactured good can lead to a decline in total manufacturing output (i.e., to de-industrialization) if the former two effects are relatively large. We also show that induced entry and a decrease in the output per firm are necessary (but not sufficient) conditions for de-industrialisation to occur.

Of course, our model is just one possible theory for de-industrialization. There are several others, including for example the recent contributions by Föllmi and Zweimüller (2008) or Murata (2009) which rely on very different mechanisms. We do like to stress, though, that there is evidence from

real-world episodes of de-industrialization that is consistent with the main features of our framework. For example, it is well documented that in some industries the adjustment to positive exogenous shocks takes place mainly at the extensive margin through a setting up of new firms rather than through an increase in the output per firm. Klemper and Graddy (1990) typify the evolution of firm numbers and industry concentration in response to new market opportunities. During an early stage, they find that firms rush in to take advantage of the new opportunities. This is followed by a stage of a shakeout that reduces the number of inefficient firms, see also Brandt et.al. (2008). An entrepreneurial industry in our definition would, thus, be one in the early stage where positive shocks generate entry, which might come with a reduction in overall industry output owing to the fixed setup costs.

Relatedly, Imbs and Wacziarg (2003) and Rodrik (2007) observe that growth among less developed countries (LDCs) typically comes with a process of "*productive diversification*" within the manufacturing sector. That is, as LDCs become more integrated into the world economy, and are thus exposed to increasing relative prices for modern sectors as emphasized in our model, they do not typically reinforce existing manufacturing specializations. Rather, they expand their production ranges and often build up new manufacturing activities. This is especially true for low-income countries at the earliest stage of development. This expansion of the product range can be associated with the entry of new firms in our model. Owing to fixed setup costs, this expansion can come – at least initially when the induced entry is strong – with a reduction in total industrial output. This mechanism highlighted by our model is, thus, jointly consistent with the observation of "*pre-mature de-industrialization*" characterizing several Latin American and Asian countries (Dasgupta and Singh, 2007) on the one hand side, and the "*productive diversification*" (Imbs and Wacziarg, 2003; Rodrik, 2007) on the other hand.

The paper is structured as follows. In section 2 we discuss some related literature. Section 3 presents our basic model structure, and the main results are derived in section 4. In section 5, we draw some tentative conclusions.

2). Relationship to the received literature

The vast majority of monopolistic competition models in the literature relies simultaneously on two key assumptions: homothetic production and constant demand elasticity. Prominent examples include Krugman (1980) and Melitz (2003) who assume only a single production factor (labour) and preferences of the constant elasticity of substitution (CES) type, which in turn leads to iso-elastic demands and constant mark-ups charged by manufacturing firms.

Empirical work strongly suggests that non-homothetic production is a highly realistic feature (McDonough, 1992), and an older literature (Helpman 1980, Horn 1983, Lawrence and Spiller 1983, Chao and Takayama 1990) has indeed started to look at non-homothetic production in monopolistic competition models, also see Helpman and Krugman (1985).[2] Those contributions typically maintain the assumption of constant demand elasticity, however, and make no reference to the mechanism leading to de-industrialization that is described in this paper.

Building on the pioneering work by Krugman (1979), there has been a very active recent literature relaxing the CES assumption in monopolistic competition models. Prominent examples of such frameworks with endogenous mark-ups include Ottaviano et al. (2002), Behrens and Murata (2007, 2012a,b), Melitz and Ottaviano (2008), Zhelobodko et al. (2012), and Behrens et al. (2014). Yet, these models assume a single production factor.

In particular, Zhelobodko et al. (2012) develop a framework with a general class of additively separable preferences allowing for pro- and anti-competitive market size effects. Thus, unlike Krugman (1979), who only considers the pro-competitive case, they also take into account the possibility that relative love of variety (the elasticity of the marginal utility of consumption) may fall as consumption rises. In such a case, an increase in the number of firms entails an increase in the market price via increasing mark-ups (an anti-competitive effect), which is counterintuitive but not an exotica (see Amir and Lambson 2000, Chen and Riordan 2007, Fabinger and Weyl 2013).

[2] Often, models with multiple factors maintain the assumption of homotheticity. See, for example, Bernard et al. (2007) or Markusen and Venables (2000) who assume differences in factor intensity across industries, but identical factor intensities in the fixed and variable input requirements within industries. Our model, by contrast, features non-homotheticity in the sense that factor intensity in the manufacturing sector depends on the scale of that industry.

In our paper, we relax both assumptions simultaneously. That is, we allow for non-homothetic production and for variable demand elasticity, leading to endogenous mark-ups. Similar as in Zhelobodko et al. (2012), we do not specify a particular functional form for consumer preferences but start from a general setup. Yet, our approach is less general than theirs is, because we impose a positive elasticity of marginal revenue with respect to price – an assumption that holds for most standard demand functions (including linear demands as in Ottaviano et al. 2002) but that may not hold in general. With respect to the technology and production side, however, our model is richer than Zhelobodko et al. (2012) because our economy features two types of labour and non-homothetic manufacturing production.

A further related model is the recent contribution by Behrens and Murata (2012a). They assume specific consumer preferences with variable demand elasticity, thus leading to endogenous mark-ups. Individuals can differ in terms of labour efficiency, but the production function is still homothetic. In Behrens and Murata (2012a), trade integration can lead to a decrease in the mass of consumed (and produced) varieties in the rich country. Such an outcome is broadly related to the notion of de-industrialization that we have in mind. However, we propose a different mechanism in this paper, which crucially hinges on variable factor intensity in the manufacturing sector that depends on the industry's scale of production (non-homotheticity).

Finally, Neary (2004, 2009) lists a number of further shortcomings and lacunae of monopolistic competition models. In several respects, our model follows standard practise and makes no attempt to improve on those criticised features.[3] Yet, at least for one item on Neary's list, we believe that our approach constitutes a small step forward. Specifically, typical monopolistic competition models postulate that entrepreneurship and production require essentially the same production factors, homogeneous labour. In our model, we make explicit that entrepreneurship and production have different factor intensities, which in turn generates a trade-off for skilled labour that is needed for both types of activities.

[3] For example, we ignore issues of strategic interaction between firms, even though Neary (2004, 2009) asks for a better reconciliation of monopolistic competition with the standard paradigm of industrial organization.

3.) The model

Consider a small open economy with exogenous endowments of unskilled labour V_1 and skilled labour V_2. All individuals have identical preferences. Production in industry 1 ("agriculture") is perfectly competitive. This good serves as the numéraire. Industry 2 ("manufacturing") is characterized by product differentiation and monopolistic competition. In total, there are n symmetrical varieties, each produced by a single firm. Both industries use both factors as variable inputs. In addition, there is a fixed input requirement of b units of skilled labour per manufacturing firm. The economy is described by the following five equations.

$$a_{11}(w_1, w_2) X_1 + a_{12}(w_1, w_2) X_2 = V_1 \tag{1}$$

$$a_{21}(w_1, w_2) X_1 + a_{22}(w_1, w_2) X_2 = V_2 - b \cdot n \equiv \tilde{V}_2(n) \tag{2}$$

$$c_1(w_1, w_2) \equiv a_{11}(w_1, w_2) w_1 + a_{21}(w_1, w_2) w_2 = p_1 \equiv 1 \tag{3}$$

$$c_2(w_1, w_2) \equiv a_{12}(w_1, w_2) w_1 + a_{22}(w_1, w_2) w_2 = MR_2(p_2) \tag{4}$$

$$\left[p_2 - c_2(w_1, w_2) \right] \cdot X_2\left(1, MR_2(p_2), V_1, \tilde{V}_2(n)\right) = w_2 \cdot b \cdot n \tag{5}$$

The a_{ij}'s are the unit input coefficients of factor i in industry j, which depend on the factor prices w_1 and w_2. By $\tilde{V}_2(n)$ we denote the amount of skilled labour available for production, which depends on the number of active manufacturing firms n. Equations (1) and (2) are factor market clearing conditions. Equation (3) represents the zero net profitability condition in the perfectly competitive industry. Equation (4) follows from profit maximisation in the monopolistically competitive industry, and states that marginal costs $c_2(w_1, w_2)$ must equal marginal revenue $MR_2(p_2)$. Finally, equation (5) is the zero profit condition in the manufacturing sector. It states that, in the long-run operating profits equal total setup costs in that industry.

In equation (5), X_j stands for the total output in industry j. Note that $X_2(\cdot)$ is an aggregate supply function which is linear-homogeneous in V_1 and $\tilde{V}_2$. It seems natural to assume that manufacturing

production is intensive in skilled labour ($a_{22}/a_{21} > a_{12}/a_{11} \ \forall w_1, w_2$). This entails that the equilibrium solution of eqs. (1)-(5) is unique, provided only that the Jacobian determinant of the production cost functions is nonzero. We assume throughout the paper that both goods are produced.

Our model has two useful properties. Firstly, it focuses on the interactions between goods and factor markets assigning a special role to skilled labour as *entrepreneurs*. As shown below, many results hinge on the allocation of skilled labour between entrepreneurial tasks (the setting up of firms) and production. Secondly, it is more general than standard models of monopolistic competition because we do not assume a specific functional form for individual preferences; in particular, we do not postulate constant demand elasticity as is often done in the literature. This allows us to consider endogenous mark-ups and the effects of price changes on firms' profit margins.

In what follows we investigate the effects of an increase in the price of a manufacturing variety, p_2, which is brought about by a rise in the world relative prices of the manufactured good.[4] In doing so, we distinguish short- and long-run effects of this price change. The short-run version of our model consists of equations (1) to (4), and the comparative static results are then derived under the assumption that the number of firms n in the manufacturing industry is fixed. All industry output adjustment occurs at the intensive margin in that case. In the long-run perspective, the number of manufacturing firms n is endogenous, and entry until the zero profit condition (5) is satisfied.

Before proceeding with the formal analysis, it is useful to point out the role played by the non-homotheticity of production in our model. Note that the long-run equilibrium condition (5) implies that $p_2 = c_2(w_1, w_2) + w_2 b / x_2$, where x_2 denotes output per firm. This expression highlights that the overall factor intensity in manufacturing depends upon the scale of production in that industry, because the setting up of firms requires only skilled labour.

[4] Since all varieties are symmetrical, there is just one price in equilibrium. We will frequently refer to the monopolistically competitive sector as the "manufactured good". Further note that, if the small country is a net exporter of the manufactured good, the relative price increase represents an improvement in the country's terms of trade.

4.) Results

We consider an increase in the world price of manufacturing varieties p_2. The small country may be a net exporter or net importer of manufacturing varieties. Totally differentiating total industry output $X_2(\cdot)$, while leaving endowments unchanged, yields

$$dX_2(\cdot) = \frac{\partial X_2}{\partial MR_2} \cdot \frac{\partial MR_2}{\partial p_2} \cdot dp_2 - \frac{\partial X_2}{\partial \tilde{V}_2} \cdot b \cdot dn \tag{6}$$

For notational convenience, we denote an elasticity by $\varepsilon_{a,b} \equiv d\log(a)/d\log(b)$. Furthermore, let $\varphi \equiv b\,n/\tilde{V}_2 > 0$ stand for the ratio of skilled labour used in the setting up of firms relative to its use in production. Finally, let relative changes be expressed by a "hat". We can then rewrite (6) as

$$\hat{X}_2 = \left[\varepsilon_{X_2,MR_2} \cdot \varepsilon_{MR_2,p_2}\right]\hat{p}_2 - \left[\varphi \cdot \varepsilon_{X_2,\tilde{V}_2}\right]\hat{n} \tag{6´}$$

We impose that marginal revenue is increasing in the price ($\varepsilon_{MR_2,p_2} > 0$), as is the case in most consumer demands with standard properties,[5] and that $\varepsilon_{X_2,MR_2} > 0$ holds. The first term in (6´) is thus positive and represents the movement along the domestic transformation curve as the relative price of the manufacturing good increases. This effect of the price increase, hence, makes for an expansion of the manufacturing industry ($\hat{X}_2 > 0$), ceteris paribus. In order to derive conditions under which an increase in the price of the manufactured good, $\hat{p}_2 > 0$, brings about de-industrialisation, $\hat{X}_2 < 0$, this term must be more than offset by the second term in (6´), which is negative if $\hat{n} > 0$ and represents the effect on output induced by an increase in the number of firms. If manufacturing production were homothetic, de-industrialization ($\hat{X}_2 < 0$) could never arise in response to $\hat{p}_2 > 0$**,** because total output and the number of firms would then always change

[5] For a linear demand function $p = a - b \cdot x$, marginal revenue can be written as $MR = a - 2b \cdot x = 2p - a$. For this case, the respective elasticity thus reads as $\varepsilon_{MR,p} = 2p/(2p-a) > 0$ which must be positive since $\frac{a}{2} < p < a$ in the relevant (elastic) part of the demand curve.

proportionally. In a model with non-homothetic production, however, the induced change in the number of firms may cause de-industrialization.

Indeed, induced entry $\hat{n} > 0$ works against domestic output expansion, because the skilled labour endowment used in production decreases. This decrease in the labour endowment $\tilde{V}_2$ may overturn – subject to certain conditions – the positive first term in (6´) and lead to a reduction in total output X_2. For this to happen, the term $\varphi \cdot \varepsilon_{X_2,\tilde{V}_2} > 0$ in (6´) must be large. This term represents a novel generalised Rybczynski effect, which is equal to the standard Rybczynski effect $\varepsilon_{X_2,\tilde{V}_2}$, weighted by the amount of skilled labour used in the setting up of firms. From the standard Rybczynski theorem, we know that $\varepsilon_{X_2,\tilde{V}_2} > 1$. This standard Rybczynski effect is magnified if $\varphi > 1$, i.e., if relatively more skilled labour is used in the setting up of firms than in production.

To derive conditions under which the price increase entails de-industrialisation, we proceed in three steps. First, we analyse how $\hat{p}_2 > 0$ affects the number of manufacturing firms. Second, in Proposition 1 we state a necessary condition for de-industrialisation, which involves the change in the output per firm induced by the price increase. Third and finally, we state a necessary and sufficient for de-industrialization in Proposition 2.

4.1. Induced entry in the manufacturing industry

Our first task is to derive an expression for the induced change in the number of firms. To this end, we totally differentiate expression (5) to obtain

$$\left[p_2 - c_2(\cdot)\right] \cdot \left[\frac{\partial X_2}{\partial MR_2(p_2)} \cdot \frac{\partial MR_2(p_2)}{\partial p_2} \cdot dp_2 - \frac{\partial X_2}{\partial \tilde{V}_2} \cdot b \cdot dn\right] + X_2(\cdot)\left[1 - \frac{\partial MR_2(p_2)}{\partial p_2}\right] dp_2$$

$$= b \cdot n \cdot \frac{\partial w_2}{\partial MR_2(p_2)} \cdot \frac{\partial MR_2(p_2)}{\partial p_2} \cdot dp_2 + w_2 \cdot b \cdot dn,$$

where we have used $c_2(\cdot) = MR_2(p_2)$ and $w_2 = w_2\left(1, MR_2(p_2)\right)$. Rewriting this in terms of relative changes, dividing by $w_2 \cdot b \cdot n = \left[p_2 - c_2(\cdot)\right] X_2(\cdot)$, using (6´) and solving for $\hat{n}$ then yields

$$\hat{n} = \frac{\varepsilon_{X_2,MR_2} \cdot \varepsilon_{MR_2,p_2} - \varepsilon_{w_2,MR_2} \cdot \varepsilon_{MR_2,p_2} + \zeta\left(1 - \dfrac{MR_2(.)}{p_2}\varepsilon_{MR_2,p_2}\right)}{1 + \varphi \cdot \varepsilon_{X_2,\tilde{V}_2}} \cdot \hat{p}_2, \qquad (7)$$

where $\zeta \equiv \left(1 + \dfrac{c_2(.)\,X_2(.)}{b\,n\,w_2(.)}\right) = \left(\dfrac{p_2 \cdot X_2(.)}{b\,n\,w_2(.)}\right) > 0$ may be interpreted as the gross value productivity of skilled labour in the setting up of firms. In order to gain insights from expression (7), it is useful to interpret it as a movement along an iso-profit line, $\pi = \left[p_2 - MR_2(p_2)\right]\ X_2(.) - w_2\ b\ n = \pi(p_2, n)$. Clearly, before and after the increase in p_2, we must have $\pi(p_2, n) = 0$ in the long-run. Therefore we can write $d\pi = (\partial\pi / \partial p_2)\,dp_2 + (\partial\pi / \partial n)\,dn = 0$. Since we know that $\partial\pi / \partial n < 0$, it follows that $dn / dp_2 > 0$ if and only if $\partial\pi / \partial p_2 > 0$. The economic interpretation of $\partial\pi / \partial p_2$ is clearcut: it stands for the short-run effect of the price increase on the profitability of the industry (keeping n fixed). In other words, the price increase will induce entry of firms if it raises the short-run profitability of the manufacturing industry. The extent of the increase in n depends upon the rate of decline of profitability as more firms enter the industry (i.e.: $-\partial\pi / \partial n = \left(1 + \varphi \cdot \varepsilon_{X_2,\tilde{V}_2}\right) w_2 b$).

The short-run effect of the price increase $\hat{p}_2 > 0$ on industry profitability shows up in expression (7) as the three terms in the numerator. We can distinguish the following channels:

Short-run output effect (SOE): Industry profitability rises because an increase in p_2 implies an increase in X_2 (keeping the profit margin from production constant), $\varepsilon_{X_2,MR_2} \cdot \varepsilon_{MR_2,p_2} > 0$. Notice that SOE also shows up as the first term in (6´) which captures the industry's overall output change.

Stolper-Samuelson effect: Industry profitability falls because the increase in p_2 entails an increase in the price of the factor intensively used in manufacturing, namely skilled labour. The rise in w_2 increases the cost of setting up firms, $-\varepsilon_{w_2,MR_2} \cdot \varepsilon_{MR_2,p_2} < 0$.[6]

Profit margin effect: Finally, the last term in the numerator of (7) stands for the profit margin effect, weighted by the productivity term ζ. In standard models with constant demand elasticity, this effect would vanish since $\varepsilon_{MR_2,p_2} = 1$. With variable demand elasticity as considered, for example, in Zhelobodko et al. (2012) or Behrens and Murata (2007), however, this term can become either positive or negative, depending on whether the price increase leads to a higher or lower profit margin (mark-up) for manufacturing firms.

Notice that, from these three effects, the SOE would also arise in standard models from the received literature, which feature homothetic production and constant demand elasticity. The latter two effects hinge on the more flexible setup of our framework. In particular, combining these two effects, we may derive the following concept, which captures how the exogenous price increase $\hat{p}_2 > 0$ changes the marginal profitability of setting up manufacturing firms (MPS):

$$MPS = \zeta\left(1 - \frac{MR_2}{p_2}\varepsilon_{MR_2,p_2}\right) - \varepsilon_{w_2,MR_2} \cdot \varepsilon_{MR_2,p_2} \tag{8}$$

In general, MPS may be positive or negative, depending on whether the price increase has a stronger effect on the mark-up in the manufacturing industry or on the factor price of skilled labour, and thereby on the setup costs for manufacturing firms. If MPS is positive, then the increase in p_2 unambiguously raises profits in the short-run, and thus leads to an increase in the number of firms. In the next subsection, we then show that MPS is crucial to determine whether the price increase may also entail de-industrialization.

[6] It should be noted that in the present framework there is no presumption of a Jones magnification effect. From standard trade theory we know that $\varepsilon_{w_2,MR_2} > 1$. Yet, in our framework we may have $0 < \varepsilon_{MR_2,p_2} < 1$, in which case the Stolper-Samuelson effect could be less than one.

4.2. Decreasing output per firm as a necessary condition for de-industrialization

Substituting (7) into (6´), rearranging terms, and solving for $\hat{X}_2$, we obtain the following expression

$$\hat{X}_2 = \frac{\varepsilon_{X_2,MR_2} \cdot \varepsilon_{MR_2,p_2} + \varphi \cdot \varepsilon_{X_2,\tilde{V}_2} \left[\varepsilon_{w_2,MR_2} \cdot \varepsilon_{MR_2,p_2} - \zeta \left(1 - \frac{MR_2(.)}{p_2} \varepsilon_{MR_2,p_2} \right) \right]}{1 + \varphi \cdot \varepsilon_{X_2,\tilde{V}_2}} \cdot \hat{p}_2 \qquad (9)$$

To derive the change in output per firm, $\hat{x}_2 = \hat{X}_2 - \hat{n}$, we subtract (7) from (9). It is straightforward to see that this yields, after some rearrangement, $\hat{x}_2 = -MPS \cdot \hat{p}_2$ as given in (8). We can thus state the following intermediate result:

Proposition 1

(a) In response to a price increase $\hat{p}_2 > 0$, output per firm falls ($\hat{x}_2 < 0$) if and only if $MPS > 0$.

(b) $MPS > 0$ is a necessary condition for $\hat{p}_2 > 0$ to entail de-industrialisation $\hat{X}_2 < 0$.

The proof of part (a) follows immediately from $\hat{x}_2 = -MPS \cdot \hat{p}_2$. To prove part (b), notice that the second term in the numerator of equation (9) can be written as $-\varphi \cdot \varepsilon_{X_2,\tilde{V}_2} \cdot MPS$. Recalling that the first term in the numerator of (9) is positive, which corresponds to the $SOE > 0$ mentioned before, de-industrialization thus requires $MPS > 0$. Stated differently, entry into the manufacturing industry induced by the price increase is a necessary (but not sufficient) condition for de-industrialization. Furthermore, it follows from equation (9) that, given $MPS > 0$, this de-industrialization is more likely to occur the larger is the generalised Rybczynski effect $\varphi \cdot \varepsilon_{X_2,\tilde{V}_2}$.

4.3. Necessary and sufficient condition for de-industrialization

Turning to the derivation of our main result (Proposition 2), note that the numerator of expression (9) is made up of two effects: the direct short-run output effect (SOE), and the induced change in the marginal profitability of setting up firms (MPS), weighted by the generalised Rybczynski term.

It can readily be seen from expressions (6´), (7) and (9) that the SOE makes for an increase in the number of firms, because it raises profitability for given firm sizes and thus constitutes an incentive for entry. This is, of course, the standard result of the received literature. The interpretation of the second term in the numerator of (9) is straightforward in the light of Proposition 1. It represents the negative (weighted) MPS. We know from Proposition 1(a) that the firm size falls if and only if the term in the square brackets is negative, i.e., if the weighted profit margin effect is positive and more than offsets the negative Stolper-Samuelson effect. Our main Proposition 2 then follows from rearranging (9) and using the definitions stated before.

Proposition 2

Assume that $MPS > 0$. A price increase of the manufactured good ($\hat{p}_2 > 0$) then implies de-industrialisation ($\hat{X}_2 < 0$) if and only if $\varphi \cdot \varepsilon_{X_2 \tilde{V}_2} > SOE/MPS$.

Proof: Follows from Proposition 1 and expressions (7), (8) and (9).

Propositions 2 is interesting, because it highlights the crucial role played by two sets of factor intensity conditions familiar from Heckscher-Ohlin trade theory. These are the Stolper-Samuelson effect in expression (8), and the relative skilled labour intensity in the setting up of firms as reflected in the novel generalised Rybczynski effect.

We may also state a corollary of Proposition 2, which highlights the crucial role played by the strength of the short-run effect of $\hat{p}_2 > 0$ in the occurrence of de-industrialisation.

Corollary to Proposition 2: The price increase $\hat{p}_2 > 0$ always implies de-industrialisation ($\hat{X}_2 < 0$) if $\varepsilon_{MR_2, p_2} \to 0$, that is, if the profit margin effect is extremely strong.

Proof: Follows directly from (9), which becomes $\hat{X}_2 = -\zeta \cdot \dfrac{\varphi \cdot \varepsilon_{X_2, \tilde{V}_2}}{1 + \varphi \cdot \varepsilon_{X_2, \tilde{V}_2}} \cdot \hat{p}_2 < 0$ as $\varepsilon_{MR_2 p_2} \to 0$.

In this limiting case, factor prices remain unchanged and there is no direct short-run output effect. Output of the manufacturing industry changes only due to an increase in the number of firms induced by an increase in the profitability of the industry.

Finally notice how the occurrence of de-industrialisation relates to equilibrium output per firm x_2. In particular, one may wonder if an increase of the manufacturing price p_2 implies the "paradoxical" result of de-industrialisation whenever x_2 falls. Yet, as is clear from Proposition 1, a fall in firm size is only a necessary, but not a sufficient condition for de-industrialisation.

5.) Conclusions

In this paper, we have described a theoretical mechanism how a price increase for the manufactured good, which may represent a terms of trade improvement, can trigger de-industrialization in a small open economy. We derive the conditions for this seemingly "paradoxical" outcome, and it turns out that several key ingredients are required for this de-industrialization to occur.

First, the price increase must raise the short-run profitability of and, thus, trigger entry into the manufacturing industry. This happens if the price change implies a strong increase in the (weighted) profit margin. Second and relatedly, output per firm must fall, so that the manufacturing sector in the economy only expands at the extensive margin, but not at the intensive margin. Finally, fixed setup costs for manufacturing firms in terms of skilled labour must be large, thus leading to a strong generalised Rybczynski effect that we have derived in this paper. Notice that this de-industrialization could not happen in standard CES models with constant demand elasticity, or in models such as Krugman (1979) or Behrens and Murata (2007, 2012b) where trade leads to exit of domestic manufacturing firms and higher output per firm. In our framework, trade may induce entry and imply lower firm output, because we do not impose that preferences must necessarily exhibit pro-competitive effects. Rather, as in Zhelobodko et al. (2012), we also allow for the anti-competitive case where the elasticity of marginal utility of consumption *falls* as consumption rises.

As stated before, our model is of course just one possible theory for de-industrialization, though one that is in line with recent empirical evidence on "*pre-mature de-industrialization*" (Dasgupta and Singh, 2007) and "*productive diversification*" (Imbs and Wacziarg, 2003; Rodrik, 2007). Investigating the relative empirical relevance of our theory compared to other frameworks of de-industrialization, such as Föllmi and Zweimüller (2008) or Murata (2009), seems to be a very important and fruitful avenue for future research that is well beyond the scope of this short paper. Future research should also investigate how our main result generalizes to more complete settings, e.g. with more than two factors or even with individual heterogeneity in labour efficiency as in Behrens and Murata (2012a).

Literature

Amir, R. and V.L. Lambson (2000), "On the Effects of Entry in Cournot Markets", *Review of Economic Studies* 67, 235-254

Behrens, K. and Y. Murata (2012a), "Globalization and Individual Gains from Trade", *Journal of Monetary Economics* 59: 703-720

Behrens, K. and Y. Murata (2012b), "Trade, Competition, and Efficiency", *Journal of International Economics* 87, 1-17

Behrens, K. and Y. Murata (2007), "General Equilibrium Models of Monopolistic Competition: A New Approach", *Journal of Economic Theory* 136, 776-787

Behrens, K., G. Mion, Y. Murata and J. Suedekum (2014), "Trade, Wages, and Productivity", *International Economic Review* 55, 1305-1348

Bernard, A., S. Redding and P. Schott (2007), "Comparative Advantage and Heterogeneous Firms", *Review of Economic Studies* 74, 31-66

Brandt, L., T. G. Rawski and J. Sutton (2008), "China's Industrial Development", in: L. Brandt and T. G. Rawski (eds.), *China's Great Transformation*, Cambridge University Press

Chao, C. C. and A. Takayama (1990), "Monopolistic Competition, Nonhomotheticity, and the Stability of the Chamberlinian Tangency Solution", *International Economic Review* 31, 73-86

Chen, Y. and M. H. Riordan (2007), "Prices and Variety in the Spokes Model", *Economic Journal* 117, 897-921

Dasgupta, S. and A. Singh (2007), "Manufacturing, Services and Premature Deindustrialization in Developing Countries: A Kaldorian Analysis", in: Mavrotas, G. and A. Shorrocks (eds), *Advancing Development: Core Themes in Global Economics*, Palgrave MacMillan, 435-456

Debande, O. (2006), "De-Industrialisation", *European Investment Bank Papers* 11, 64-82

Fabinger, M. and G.Weyl (2013), "Pass-Through as an Economic Tool: Principles of Incidence under Imperfect Competition", *Journal of Political Economy* 121, 528-583.

Felipe, J. and G. Estrada (2008), "Benchmarking Developing Asia's Manufacturing Sector", *International Journal of Development Issues* 7, 97-119

Foellmi, R. and J. Zweimüller (2008), "Structural Change, Engel's Consumption Cycles and Kaldor's Facts of Economic Growth", *Journal of Monetary Economics* 55, 1317-1328

Helpman, E. (1980), "International Trade in the Presence of Product Differentiation, Economies of Scale and Monopolistic Competition: A Chamberlin-Heckscher-Ohlin Approach", *Journal of International Economics* 11, 305-340

Helpman, E. and P. Krugman (1985), *Market Structure and Foreign Trade*, Cambridge: MIT Press

Horn, H. (1983), "Some Implications of Non-Homotheticity in Production in a Two-Sector General Equilibrium Model with Monopolistic Competition", *Journal of International Economics* 14, 85-101

Imbs, J. and R. Wacziarg (2003), "Stages of Diversification", *American Economic Review* 93, 63-86

Kaldor, N. (1966), *Causes of the Slow Rate of Economic Growth of the United Kingdom*, Cambridge University Press

Kaldor, N. (1967), *Strategic Factors in Economic Development*, New York State School of Industrial and Labour Relations, Cornell University, Ithaca NY

Klepper, S. and E. Graddy (1990), "The Evolution of New Industries and the Determinants of Market Structure", *Rand Journal of Economics* 21, 27-44

Krugman, P. (1980), "Scale Economies, Product Differentiation and the Pattern of Trade", *American Economic Review* 70, 950-959

Krugman, P. (1979), "Increasing Returns, Monopolistic Competition, and International Trade", *Journal of International Economics* 9, 469-479

Lawrence, C. and P. T. Spiller (1983), "Product Diversity, Economies of Scale and International Trade", *Quarterly Journal of Economics* 98, 63-83

Markusen, J. and A. Venables (2000), "The Theory of Endowment, Intra-Industry Trade and Multi-national Trade", *Journal of International Economics* 52, 209-234

McDonough, L. (1992), "Homothetic and Non-Homothetic Scale Economies in Applied General Equilibrium Analysis", *Canadian Journal of Economics* 25, 196-210

Melitz, M. (2003), "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity", *Econometrica* 71, 1695-1725

Melitz, M. J. and G. I. P. Ottaviano (2008), "Market Size, Trade and Productivity", *Review of Economic Studies* 75, 295-316

Murata, Y. (2009), “On the Number and the Composition of Varieties”, *Economic Journal* 119, 1065-1087

Neary, J. P. (2009), “Putting the ‘New’ into New Trade Theory: Paul Krugman’s Nobel Memorial Prize in Economics”, *Scandinavian Journal of Economics*, 111, 217-250

Neary, J. P. (2004), “Monopolistic Competition and International Trade Theory”, in: Brakman, S. and B. Heijdra (eds.), *The Monopolistic Competition Revolution in Retrospect*, Cambridge University Press, 159-184

Ottaviano, G., T. Tabuchi and J.-F. Thisse (2002), “Agglomeration and Trade Revisited”, *International Economic Review* 43, 409-435

Rodrik, D. (2007), “Industrial Development: Stylized Facts and Policies”, in: Di Sano, J. (ed.), *Industrial Development for the 21st Century: Sustainable Development Perspectives*, New York: United Nations, 7-28.

Woodland, A. (1982), *International Trade and Resource Allocation*, Amsterdam: North-Holland

Zhelobodko, E., S. Kokovin, M. Parenti and J. Thisse (2012), “Monopolistic Competition: Beyond the Constant Elasticity of Substitution”, *Econometrica* 80, 2765-2784

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