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# The role of the manufacturing sector in Southeast Asian development: a test of Kaldor's first law

The so-called Kaldor laws are a series of empirical regularities put forward by Kaldor in a 1966 lecture (Kaldor, 1966). They are three "laws" of *long-run* character that attempt to explain the differences in the growth rates among developed countries, and that represent the basis of Kaldor's model of "cumulative causation," that is, the process of interaction between increases of demand induced by increases in supply generated in response to increases in demand.[1] Kaldor viewed the advanced countries as having a dual nature very similar to that of the developing countries, with an agricultural sector with low productivity and surplus labor, and a capital-intensive industrial sector characterized by rapid technical change and increasing returns. Under these circumstances, the transfer of labor resources from the agricultural sector to the more productive sectors of the economy—that is, the industrial sector—will depend on the growth of the latter's derived demand for labor. It is in this sense that the industrial sector, and in particular manufacturing, is viewed as the "engine of growth," and that is why Kaldor viewed growth as peculiarly associated with the industrial activities of the economy.[2] Hence, Kaldor's ideas have relevance for explaining

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[1] Four excellent surveys of this literature are the *Journal of Post Keynesian Economics*, vol. 5, no. 3, 1983; McCombie, 1986; Scott, 1989; and McCombie and Thirlwall, 1994.

[2] The interpretation of Kaldor as regarding the manufacturing sector as "the engine of growth" is from Thirlwall (Symposium on Kaldor's Laws, 1983). Scott (1989) questions this interpretation. Likewise, one controversial aspect in Kaldor's argument



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the process of growth in the developing countries as well. In the words of Kaldor:

> [T]he contention that I intend to examine is that fast rates of economic growth are almost invariably associated with the fast rate of growth of the secondary sector, mainly, manufacturing, and that this is an attribute of an intermediate stage of development; it is a characteristic of the transition from "immaturity" to "maturity." [Kaldor 1967, p. 7]

This paper attempts to offer insight into the development process of five Southeast Asian countries, Indonesia, Malaysia, the Philippines, Singapore, and Thailand (i.e., the member countries of ASEAN), during the last twenty five years, using time series for each of them. In particular, we look at the role of the manufacturing sector as generator of externalities in the context of Kaldor's first law. A second objective here is to reconsider how one should interpret Kaldor's first law. Goh (1996, p. 1) summarized the role of industry in the development process of Singapore:

> The growth of industry from the late 1960s cleared the backlog of unemployment, created demand for technical staff which transformed the education system and facilitated technology transfer to Singaporean companies. It also proved a developmental force as it moved into neighboring countries when labour shortage in Singapore became a constraint.

Except Singapore, which is already a newly industrialized economy (NIE), the ASEAN members represent the *third ladder* in the development process of Asia, after Japan and the NIEs. All but the Philippines have been noted for their unique performance since 1960 by the World Bank (1993) in the recently published *East Asian Miracle Report*. Table 1 displays the growth rates of GDP per worker for different subperiods. The figures in the last three rows can be

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is where the initial *demand* push that triggers the growth of manufacturing exports comes from. Kaldor's explanations, i.e., demand for exports of manufactures, and land-saving innovations in agriculture, are disputed by Scott (1989, pp. 350–359). I am thankful to two referees for pointing out that Kaldor (1967) made special reference to developing economies, acknowledging that there may be a two-way causation between the two sectors of the economy. In his analysis, Kaldor questioned "what hampered, or prevented, the process of industrialization outside a favored group of countries? . . . if one is looking for some *general* cause which is common to most countries . . . it is the backwardness of agriculture" (Kaldor, 1967, p. 55). See also Thirlwall (1986) for explicit references to developing countries.

**Table 1**
**Average growth rates of GDP per worker ASEAN members (%)**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| 1950–60 | | | 4.16 | | –0.19 |
| 1955–60 | | –0.36 | | | |
| 1960–70 | 1.63 | 3.41 | 1.76 | 6.59 | 5.17 |
| 1970–80 | 4.88 | 5.54 | 3.30 | 7.43 | 4.02 |
| 1980–90 | 3.80 | 3.37 | –0.67 | 4.91 | 6.12 |
| 1950–92 | | | 1.80 | | 3.83 |
| 1955–92 | | 3.70 | | | |
| 1960–92 | 3.61 | | | 5.45 | |

*Source:* Calculated using the World Bank database (1993).

compared with those given by the World Bank (1993, pp. 2, 3) for other regions (1965–90 average growth GNP per capita): South Asia, 1.9 percent; Middle East and Mediterranean, 1.8 percent; Sub-Saharan Africa, 0.2 percent; OECD, 2.2 percent; Latin America and Caribbean, 1.8 percent.

Table 2 shows the average annual rate of growth of some sectoral variables for the period 1967–92. It is worth noting the general high values in the table, except for the Philippines, which clearly stands out as the worst performer in the region. The table shows the rapid growth of the manufacturing sector in the five economies, outpacing the growth of agriculture and services, as well as that of the overall economy, in terms of both GDP and capital stock. Also, labor in the manufacturing sector has grown faster than in agriculture and in the overall economy. Actually, in the case of Singapore, the growth of the labor force in agriculture was negative during the period under analysis, and in the case of Malaysia it was almost zero. This indicates that the latter is reaching a stage of "maturity" where the agricultural sector plays a smaller role. Singapore is a different case altogether. The figures on growth of productivity indicate a very rapid increase in labor productivity in the manufacturing sector, with the exception of the Philippines. It is also important to note that labor productivity in agriculture has increased, and in the case of Malaysia, as much as in manufacturing. It is notorious, on the other hand, that the increase in labor productivity in the Philippines has been much smaller than in the other countries. In the case of Singapore, the increase in labor productivity in agriculture, which is faster than in manufacturing, is due simply to the faster decrease

**Table 2**
**Average annual growth rate and shares of selected variables for ASEAN members, 1967–92 (%)**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| $G_Y$ | 6.69 | 6.71 | 3.24 | 8.23 | 7.29 |
| $G_K$ | 9.30 | 8.88 | 5.61 | 11.97 | 9.47 |
| $G_{YMA}$ | 11.75 | 9.45 | 3.62 | 9.43 | 9.64 |
| $G_{KMA}$ | 14.63 | 11.63 | 5.83 | 13.29 | 11.84 |
| $G_{YAG}$ | 4.01 | 4.34 | 2.40 | –1.53 | 4.30 |
| $G_{SE}$ | 7.05 | 7.02 | 3.29 | 8.04 | 7.32 |
| $G_L$ | 2.20 | 3.24 | 2.51 | 3.06 | 2.57 |
| $G_{LMA}$ | 3.34 | 6.15 | 2.55 | 4.75 | 3.92 |
| $G_{LAG}$ | 1.45 | 0.60 | 1.45 | –7.30 | 1.75 |
| $G_{PR}$ | 4.49 | 3.47 | 0.73 | 5.17 | 4.72 |
| $G_{PRMA}$ | 8.41 | 3.30 | 1.07 | 4.68 | 5.72 |
| $G_{PRAG}$ | 2.56 | 3.74 | 0.95 | 5.77 | 2.55 |
| $Y_{MA}/Y$ | | | | | |
| 1967 | 5.73 | 14.52 | 22.88 | 21.65 | 15.50 |
| 1992 | 20.32 | 28.23 | 28.03 | 29.24 | 27.92 |
| $Y_{IN}/Y$ | | | | | |
| 1967 | 21.25 | 33.30 | 31.15 | 31.67 | 27.26 |
| 1992 | 38.16 | 43.50 | 34.69 | 38.22 | 41.01 |
| $\theta_{80-94}$ | 20.57 | 29.26 | 13.80 | 28.16 | 23.05 |
| $h_{80}$ | 20.5 | 15.7 | 14.4 | 21.5 | 15.8 |
| $h_{90}$ | 15.2 | 14.8 | 15.5 | 29.4 | 14.5 |

*G* stands for average annual growth rate. Subscripts: *Y*: overall GDP; *K*: Total stock of capital; *YMA*: manufacturing GDP; *KMA*: Stock of capital manufacturing sector; *YAG*: agricultural GDP; *SE*: service sector GDP; *L*: overall employment; *LMA*: manufacturing employment; *LAG*: agricultural employment; *PR*: labor productivity overall economy; *PRMA*: labor productivity manufacturing sector; *PRAG*: labor productivity agriculture.
$Y_{MA}/Y$ and $Y_{IN}/Y$ are the shares of manufactures and the total industry in GDP, respectively. $\theta$ is UNIDO's index of structural change. Zero indicates no structural change, and 90 maximum structural change. *h* is UNIDO's index of specialization. Zero indicates that the shares of all branches are equal. If only one branch exists, the value is 100. See UNIDO technical notes.

in the absolute number of workers than to the increase in the output of the sector. Finally, $\theta$ is the index of structural change calculated by the United Nations Industrial Development Organization (UNIDO). This coefficient varies between 0 and 90, and it is interpreted as the angle between two vectors $s_i(t-1)$ and $s_i(t)$ at times $t-1$ and $t$, respectively, where $s_i$ is the share of the *i*th manufacturing branch in total manufacturing value added. The coefficient indicates similar degrees of structural change within the manufacturing sector in four of the ASEAN countries (although in different directions) during the period 1980–94. The degree of structural change in the Philippines has been much smaller. During this period, Indonesia appears to have undergone the most significant degree of diversification, as reflected in the decrease in the coefficient of specialization $h$, while Singapore has seen an increase in the degree of concentration.

### Kaldor's first law

Most empirical work in the area of Kaldor's laws has concentrated on the second law, the so-called Verdoorn's law. This law states that there is a positive relationship between the growth of labor productivity and that of output in both manufacturing and overall industry. This paper, however, focuses on Kaldor's first law.[3] This law states that there is a strong positive correlation between overall GDP growth ($G_Y$) and manufacturing growth ($G_{YMA}$). Why does manufacturing exercise such an important role in explaining growth? Kaldor argued that, when industrial production and output expand, labor resources are drawn from sectors with disguised unemployment and surplus labor so that this transfer does not produce a reduction in the output of these sectors, and thus productivity increases outside the industrial sector (i.e., resources in those sectors have little opportunity cost). Therefore, the faster manufacturing grows, the faster the rate of transfer of labor from the sectors subject to diminishing returns. Another important reason is that manufacturing possesses greater backward and forward linkage effects than other sectors of the economy, strengthening the cumulative nature of development. A third reason, Kaldor argued, is that the industrial sector, and manufacturing in particular, is subject to increasing returns, both static (i.e., derived from size and scale of production) and dynamic (i.e., learning by doing). Finally, the balance-of-payments constraint is another factor that can explain the impact of the manufacturing sector on overall growth: A faster growth of the secondary sector will, by relaxing the balance-of-payments constraint, lead to a faster growth of GDP and, hence, nonmanufacturing output.[4] The policy implication is

[3] There is a third law, which establishes that there is a positive association between overall productivity growth and employment growth in manufacturing. In fact, the three laws are interconnected.

[4] The interpretation of the first law is not exempt of problems, since it is a highly aggregated reduced-form equation, a hybrid model of demand- and supply-side factors.

that actions (both by the government and by the market itself) should be taken in order to move into a higher stage of economic development by promoting the transfer of resources from agriculture to industry.[5]

Together with this law, Kaldor stated some additional relationships in order to support it, and in particular to avoid the criticism that, since manufacturing is an important component of GDP, a good fit should be expected when regressing $G_Y$ on $G_{YMA}$. One of these relationships is that there is a strong correlation between nonmanufacturing output growth ($G_{YNMA}$) and manufacturing output growth.[6] Algebraically,

$$G_{YNMA} = a + b\, G_{YMA}. \tag{1}$$

According to Stavrinos (1987, p. 1202), equation (1) is "the only relationship between the various output growth rates which is of any economic and statistical significance." This, as shown below, is not correct; expression (1) presents serious econometric problems.[7]

Although Kaldor used equation (1) to test this proposition, a different way to analyze the impact of the manufacturing sector on the rest of the economy is by estimating it within a more "structural" framework. The

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This paper emphasizes the latter (see note 8). Besides, as a referee has pointed out to me, the problem with the mechanisms described is that they will be reflected in the rate of growth of productivity, and not output, in the nonmanufacturing sector, unless there is a strong correlation between the two via relative price changes, which Kaldor disputes. The argument goes as follows: It is possible for a rapid acceleration in manufacturing output to occur, increasing the transfer of labor from the nonmanufacturing sector, increasing productivity growth in that sector, and yet, if there is no commensurate increase in the growth of demand for manufacturing output, there would be no statistically significant correlation between the growth of nonmanufacturing output and that of manufacturing output.

[5] To test this law, Kaldor pooled data for twelve developed countries for the period 1953–54 to 1963–64. He used the growth rate for the whole period, twelve data points. In this regression Kaldor obtained $R^2 = 0.959$ and a slope of 0.614. It seems that Kaldor mostly emphasized the goodness of fit of this and the other regressions he estimated.

[6] In this regression Kaldor obtained a coefficient of determination of 0.824 and a slope of 0.55.

[7] Besides, as a referee pointed out, one could also regress GDP growth on the excess of manufacturing growth over nonmanufacturing growth ($G_{YMA} - G_{YNMA}$). This is another proposition put forward by Kaldor in the context of the first law. This, together with the rest of Kaldor's laws in the context of the Southeast Asian countries, is discussed in detail in Felipe (1995). Here we just show the results of this regression, which appear to corroborate Kaldor's predictions in the cases of Malaysia and Singapore, and to a much lesser degree for the other three countries. Kaldor obtained a coefficient of determination of 0.562 and a slope of 0.954.

reason is the lack of explicit theoretical underpinning behind equation (1), since the law does not specify the underlying production technology, and in particular the difficulty in interpreting the parameter $b$.[8] Furthermore, Kaldor stressed only that the relationship appeared to be significant and that the proportion of variance explained was high. Feder's (1983) model appears to be suitable for this purpose.[9] This is a two-sector supply-side framework that allows one to model together the externality effect of the manufacturing sector on the rest of the economy with the relative factor productivity of the manufacturing and nonmanufacturing sectors (i.e., which sector is more efficient). The model assumes two production functions:

$$NM = NM(K_{NM}, L_{NM}, M); \quad (2)$$

**Note 7 table: Kaldor's proposition:** $G_Y = a + b(G_{YMA} - G_{YNMA})$

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| $b$ | −0.05 | 0.33 | 0.11 | 0.31 | 0.13 |
| | (−0.50) | (2.28) | (0.55) | (3.31) | (1.00) |
| $R^2$ adj. | −0.03 | 0.15 | −0.03 | 0.29 | 0.0005 |
| DW | 1.80 | 1.35 | 1.09 | 0.72 | 1.26 |
| $\chi^2_1$ | 2.70 | 1.28 | 3.04 | 0.06 | 2.32 |
| $\chi^2_2$ | 12.84** | 8.90* | 12.92* | 14.95* | 0.75 |

* $\chi^2_1$ is Ramsey's RESET test for functional form using the square of the fitted values. Critical values are 3.84 and 2.71 for 95 percent and 90 percent confidence, respectively; $\chi^2_2$ is the Bera-Jarque test for Normality. Critical values are 5.99 and 4.61 for 95 percent and 90 percent confidence, respectively. * = rejection of the null hypothesis at 5 percent; ** = rejection of the null hypothesis at 10 percent; *t*-statistics in parentheses.

[8] Maybe Lord Kaldor would not agree with our methodology, since we propose the use of an aggregate production function instead of his original *technical progress function*. Also, as a referee pointed out, the use of the production function, especially for the nonmanufacturing sector, with surplus labor, is distinctly un-Kaldorian. However, McCombie and de Ridder, for example, in referring to Verdoorn's law indicate that "the Verdoorn coefficient, *per se*, cannot be interpreted as a measure of returns to scale unless the contribution of the capital stock growth ($k$) is explicitly included in the Verdoorn equation or there is some evidence that its omission does not bias the coefficient" (McCombie and de Ridder, 1984, p. 270). McCombie and Thirlwall (1994, ch. 2) argue in similar terms.

[9] Feder's original paper refers to the impact of the export sector on the nonexport sector. This framework has been used by Ram (1986) to analyze the impact on government expenditures on the rest of the economy; Adams et al. (1990) combine exports and government.

(3) $$M = M(K_M, L_M),$$

where $NM$ is nonmanufacturing output, $M$ is manufacturing output, and $K$ and $L$ are the stock of capital and employment with the corresponding subscripts. The peculiarity of the model is that output of the nonmanufacturing sector is dependent on the size of the manufacturing sector. This reflects the impact of the $M$ sector on the $NM$ sector discussed above (supposedly positive). This effect would reflect factors such as the development of more efficient and competitive management, production, and marketing techniques, and so on. This way, the inclusion of $M$ in the production function of $NM$ has a structural interpretation. It is also assumed that there is no such effect in the reverse direction. Feder related the marginal productivities through the assumption

(4) $$\frac{M_K}{NM_K} = \frac{M_L}{NM_L} = 1 + \delta,$$

where the subscripts represent the partial derivatives, and $\delta$ the externalities from the manufacturing sector on the rest of the economy; $\delta$ is hypothesized to be $> 0$. This means that the marginal factor productivities in the manufacturing sector are higher than those in the nonmanufacturing sector. This leads to the following specification:[10]

(5) $$\frac{\dot{Y}}{Y} = \alpha\left(\frac{I}{Y}\right) + \beta\left(\frac{\dot{L}}{L}\right) + \gamma\left(\frac{\dot{M}}{M}\right)\left(\frac{M}{Y}\right),$$

where $I$ is total investment, the dots denote derivatives with respect to time, $\alpha$ measures the marginal product of capital of the nonmanufacturing sector (i.e., $\alpha = NM_K$), and $\gamma$ measures the relative efficiency of the manufacturing sector (i.e., overall effect of manufacturing sector's size), or the gain from shifting resources from the nonmanufacturing to the manufacturing sector. The last term of the previous equation can be split into two components, giving rise to a second specification:[11]

(6) $$\frac{\dot{Y}}{Y} = \alpha\left(\frac{I}{Y}\right) + \beta\left(\frac{\dot{L}}{L}\right) + (\delta' - \theta)\left(\frac{\dot{M}}{M}\right)\left(\frac{M}{Y}\right) + \theta\left(\frac{\dot{M}}{M}\right),$$

[10] Expression (5) is derived by differentiating relationships (2) and (3), adding them up (i.e., change in total output), and substituting the linkage equation (4).

[11] Expression (6) is derived from (5) by specifying the behavior of $NM_M$ (marginal externality effect of manufacturing on the output of nonmanufacturing). It is assumed

where $\delta' = [\delta/(1 + \delta)]$ and $\delta$ and $\theta$ in equation (6) are the intersectoral factor productivity difference, and the marginal externality effect of the manufacturing sector (in terms of size) on the rest of the economy, respectively.

An alternative framework to analyzing the role of the manufacturing sector is to estimate separately the marginal productivity of nonmanufacturing output (i.e., the rest of the economy) with respect to manufacturing output, and vice-versa, that is, the marginal productivity of manufacturing output with respect to nonmanufacturing output, in two different equations. Our conjecture, in the context of Kaldor's arguments, is that the former should be larger than the latter. This would corroborate the arguments developed above. In this case, we assume the following two production functions:

$$NM = NM\,(K_{NM}, L_{NM}, M); \tag{7}$$

$$M = M\,(K_M, L_M, N_M), \tag{8}$$

where $NM$ represents nonmanufacturing output, $M$ is manufacturing output, and $K$ and $L$ are the capital stock and employment with the corresponding subscripts.[12] Notice that, unlike in Feder's model, here we have externalities going in both directions. Differentiating with respect to time and expressing them in growth rates, we obtain:

$$G_{MA} = \frac{\partial NM}{\partial K_{NM}}\frac{\dot{K}_{NM}}{K_{NM}}\frac{K_{NM}}{NM} + \frac{\partial NM}{\partial L_{NM}}\frac{\dot{L}_{NM}}{L_{NM}}\frac{L_{NM}}{NM} + \frac{\partial NM}{\partial M}\frac{\dot{M}}{M}\frac{M}{NM}; \tag{9}$$

$$G_{YMA} = \frac{\partial M}{\partial K_M}\frac{\dot{K}_M}{K_M}\frac{K_M}{M} + \frac{\partial M}{\partial L_M}\frac{\dot{L}_M}{L_M}\frac{L_M}{M} + \frac{\partial M}{\partial NM}\frac{\dot{NM}}{NM}\frac{NM}{M}, \tag{10}$$

where the dot represents the derivative with respect to time. The coefficients in the last two terms of the growth equations (9) and (10), that

that manufacturing affects the production of nonmanufacturing with constant elasticity, that is,

$$NM = NM\,(K_{NM}, L_{NM}, M) = M_{\theta}\,\psi\,(K_{NM}, L_{NM}).$$

[12] Cho (1994) proxied the effect of industrialization by the average annual increase in the proportion of the labor force employed in manufacturing. This represents another possibility.

is, $NM_M = \partial NM/\partial M$ and $M_{NM}=\partial M/\partial NM$, give us the marginal productivities of output in one sector of the economy with respect to the other sector's output.[13] The disadvantage with respect to Feder's model is that we have to estimate two equations; however, notice that one does not need any assumption linking the marginal productivities of capital and labor in the two sectors.[14] Given the role of manufacturing assigned by Kaldor, one would expect $NM_M > M_{NM}$.[15] This way, the joint analysis of equations (9) and (10) suggests that the interpretation of Kaldor's first law can be extended to imply that the direction of *causality* runs from the growth of manufacturing to that of nonmanufacturing.[16] It should be pointed out that this does not necessarily mean that $M_{NM}$ in equation (10) should be zero. It should also be noted that, from an econometric point of view and within this framework, equation (1) appears to be a misspecified relationship, and therefore is subject to omitted-variables bias. This is an empirical issue to which we will return in the next section.

## Empirical results

This section presents the estimations of the models previously discussed, namely, equations (1), (5)-(6), and (9)-(10). The period of analysis is 1967–92. Table 3 shows the estimates of expression (1), Kaldor's original formulation. Looking at the parameter estimates, the results seem to support the proposition, except in the case of Indonesia. However, the statistics provided in the table indicate a poor overall fit and, in some countries, functional form and normality problems. Also, the Durbin-Watson statistics are rather low, except in Thailand. Finally, we reject the weak exogeneity of $G_{YMA}$ with respect to $b$, indicating that the ordinary least squares (OLS) estimator is inconsistent, and thus these equations cannot be used for efficient estimation and hypothesis testing

[13] The variables are the growth rates of each variable weighted by the ratio of each variable to the sector's output.

[14] Also notice that these estimates are not directly comparable with those of Feder's model, since the functional forms are different. The only two results that are directly comparable are those of equations (1) and (9).

[15] Prebisch also remarked that technological change and increases in productivity in the manufacturing sector tend to spread more to the rest of the economy (i.e., externalities are higher) than those of other sectors, in particular primary production (Palma, 1989, p. 292).

[16] McCombie (1982, p. 283), in this context, referred to "the obvious problem concerning the direction of causality." However, he did not elaborate on the issue.

**Table 3**
**Kaldor's first law: expression (1)**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| $a$ | 4.78<br>(3.57) | 2.56<br>(2.87) | 1.38<br>(1.80) | 6.00<br>(6.85) | 4.19<br>(3.84) |
| $b$ | 0.10<br>(0.99) | 0.36<br>(4.31) | 0.48<br>(3.95) | 0.19<br>(2.56) | 0.25<br>(2.50) |
| $\bar{R}^2$ | 0.04 | 0.44 | 0.40 | 0.19 | 0.21 |
| DW | 1.22 | 1.02 | 1.35 | 0.84 | 1.72 |
| $\chi_1^2$ | 2.65 | 1.30 | 10.10* | 0.07 | 0.87 |
| $\chi_2^2$ | 2.88 | 5.71 | 35.00* | 9.44* | 0.60 |

$\chi_1^2$ is Ramsey's RESET test for functional form using the square of the fitted values. Critical values are 3.84 and 2.71 for 95 percent and 90 percent confidence, respectively; $\chi_2^2$ is the Bera-Jarque test for Normality. Critical values are 5.99 and 4.61 for 95 percent and 90 percent confidence, respectively. * = rejection of the null hypothesis at 5 percent; ** = rejection of the null hypothesis at 10 percent; $t$-statistics in parentheses.

without developing a marginal model for $G_{YMA}$ (Engle, Hendry, and Richard, 1983).

It is also worth mentioning that when we pooled data for the five countries, the regression equation obtained was,

$$G_{YNMA} = 3.24 + 0.30\ G_{YMA}.$$

$$(7.38)\ (7.40)$$

($t$-statistics in parentheses) with an $R^2$ of 0.30, much lower than the one obtained by Kaldor for the developed countries (i.e., 0.824).[17] Setting $G_{YNMA} = G_{YMA}$, the estimates indicate that, for the five ASEAN economies, rates of growth in nonmanufacturing over 4.66 percent a year correspond to growth of rates in manufacturing above that figure (i.e., the share of the manufacturing sector is increasing). Or, in different terms, if manufacturing grows at a rate below 4.66 percent, the rest of the economy will grow less than the manufacturing sector. Performing this calculation with the individual country data, we see that the

[17] Ramsey's test for functional form indicates misspecification (i.e., $\chi_1^2 = 7.56$); likewise, the Bera-Jarque test for normality indicates nonnormal disturbances (i.e., $\chi_2^2 = 30.45$). This regression was run with annual growth rates. Kaldor used the growth rate for a whole decade.

**Table 4**
**Feder's model manufacturing sector: total effect—expression (5)**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| $\gamma$ | 0.32<br>(0.55) | 1.78<br>(5.03) | 2.81<br>(18.75) | 1.42<br>(7.00) | 1.93<br>(6.25) |
| $R^2$ | 0.01 | 0.52 | 0.86 | 0.68 | 0.63 |
| DW | 1.93 | 1.00 | 1.64 | 0.82 | 1.84 |
| $\chi_1^2$ | 0.098 | 4.79* | 9.42* | 0.008 | 3.25 |
| $\chi_2^2$ | 12.2* | 1.92 | 0.38 | 6.90* | 0.25 |

* Same as Table 3.

equivalent rate for the Philippines is around 2.65 percent, and for Singapore 7.4 percent. For the other three countries it remains around 4–5 percent.

We have also fitted equations (5) and (6)—that is, Feder's model—to both the manufacturing sector and the overall industrial sector for the period 1967–92. Results are shown in Tables 4–5 and 6–7. It must be pointed out that, because of the high collinearity between the last two terms in equation (6), we have been unable to estimate together the externality effect ($\theta$) and the efficiency differential ($\delta$), and we shall show only the former. This way, the model loses some of its initial theoretical power and, for this reason, these estimates must be viewed with caution.[18] We must also mention that, in general, the equations have quite a few statistical problems.[19] The analysis of $\gamma$ for the manufacturing sector (Table 4) indicates that this branch of the economy is 140 percent to 280 percent more efficient than the rest of the economy in using resources, except in Indonesia where the estimated differential is zero; likewise, a 10 percent increase in manufacturing output leads to an increase in output in the rest of the economy of 1.8 percent in Indonesia,

[18] Similar problems were encountered by Rana (1985) in his analysis of the role of exports pooling data for a large group of Asian countries.

[19] In particular, we must mention parameter instability when the equations were estimated recursively. Also, the last term of (5) is not weakly exogenous for the parameter of interest, $\gamma$; likewise, the last term of (6) is not weakly exogenous for $\theta$. Similar comments apply to the results in Tables 6 and 7 for the total industry. For these reasons, all these results must be viewed with caution.

**Table 5**
**Feder's model manufacturing sector: externality—expression (6)**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| θ | 0.18<br>(2.23) | 0.48<br>(7.50) | 0.67<br>(10.12) | 0.39<br>(7.53) | 0.43<br>(5.30) |
| $\bar{R}^2$ | 0.18 | 0.71 | 0.81 | 0.71 | 0.55 |
| DW | 1.89 | 1.11 | 1.41 | 0.85 | 1.60 |
| $\chi_1^2$ | 1.96 | 1.81 | 10.54* | 0.04 | 0.98 |
| $\chi_2^2$ | 2.68 | 6.96* | 0.16 | 16.76* | 0.09 |

* Same as Table 3.

**Table 6**
**Feder's model total industry: total effect—expression (5)**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| γ | 0.67<br>(5.60) | 1.46<br>(6.78) | 1.58<br>(18.75) | 1.36<br>(14.37) | 1.39<br>(7.97) |
| $\bar{R}^2$ | 0.57 | 0.68 | 0.93 | 0.90 | 0.73 |
| DW | 2.06 | 1.20 | 2.40 | 1.69 | 2.09 |
| $\chi_1^2$ | 7.04* | 2.30 | 0.24 | 0.91 | 0.03 |
| $\chi_2^2$ | 1.06 | 0.07 | 1.69 | 0.03 | 0.63 |

* Same as Table 3.

4.8 percent in Malaysia, 6.7 percent in the Philippines, 3.9 percent in Singapore, and 4.3 percent in Thailand (θ in Table 5).[20] Also notice that, among the four ASEAN countries with significant results, Singapore displays the lowest productivity differential. This could be the result of its higher level of development. In other words, during the development process, intersectoral differences tend to diminish, and the relocation of resources from the less to the more productive sectors occurs until these differences vanish. This way, intersectoral differences in marginal productivities would be smallest among developed countries. With respect to the whole industrial sector (Tables 6–7), the results are

[20] The equations for Indonesia, Malaysia, Singapore, and Thailand in Table 4 did not include the investment share and the employment growth, since both were insignificant. The equation for the Philippines included the investment share (but not employment growth), with a coefficient of 0.00255 and a *t*-statistic of 3.00. In the case of Table 5, all five equations were estimated only with the growth of manufacturing output. The other three variables were statistically insignificant.

**Table 7**
**Feder's model total industry: externality—expression (6)**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| $\theta$ | 0.21 | 0.59 | 0.57 | 0.51 | 0.53 |
| | (5.46) | (7.97) | (17.44) | (15.18) | (8.28) |
| $\bar{R}^2$ | 0.56 | 0.73 | 0.93 | 0.91 | 0.74 |
| DW | 2.12 | 1.21 | 2.37 | 1.57 | 2.22 |
| $\chi_1^2$ | 5.66* | 1.96 | 0.08 | 1.75 | 0.32 |
| $\chi_2^2$ | 2.22 | 0.75 | 4.33 | 0.63 | 1.07 |

* Same as Table 3.

similar. Nevertheless, it is important to notice that the efficiency differential parameter ($\gamma$) in Table 6 is smaller in all cases than in Table 4, reflecting that there is a higher productivity differential with respect to the manufacturing subsector than with respect to the whole secondary sector. It is also interesting to notice that now the differential estimated for Indonesia in Table 6 (i.e., 67 percent) is statistically significant, and is about half the estimate for the other four countries. Likewise, the externality parameter estimated now is 0.21 for Indonesia and around 0.5–0.6 for the other countries (Table 7).[21]

Overall, these results allow us tentatively to divide the ASEAN countries into three groups, according to the role of the secondary sector. The first is Indonesia, which has a little developed secondary sector, still not much more efficient than the rest of the economy, and not yet capable of inducing important externalities to the rest of the economy. The second group includes Malaysia, the Philippines, and Thailand. In these three cases, the secondary sector is much more efficient than the rest of the economy, indicating that there is still room for transfer of resources. Also, the externalities to the rest of the economy are very important. Finally, Singapore, the most advanced country, stands by itself in the third group. Its secondary sector is also more efficient than the rest of

[21] This could be due to a lower level of integration of the different sectors of the Indonesian economy and a lack of interdependence between activities, typical of the less developing countries. Indonesia attained high rates of economic growth without a large manufacturing base because of its unusually skilled management of its natural resource base. Moreover, when Indonesia began to shift toward manufactured exports in the mid 1980s, its growth rate accelerated. Jansen (1991, p. 27) also points out that intersectoral linkages in Thailand are relatively underdeveloped.

**Table 8**
**Estimates of marginal productivities for ASEAN members—expression (9)**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| $NM_M = \partial NM/\partial M$ | 0.034<br>(0.067) | 1.38<br>(3.75) | 1.60<br>(5.33) | 1.08<br>(5.52) | 0.94<br>(2.94) |
| $R^2$ | 0.42 | 0.40 | 0.61 | 0.61 | 0.33 |
| DW | 1.83 | 1.18 | 1.75 | 1.18 | 1.68 |
| $\chi_1^2$ | 0.78 | 1.02 | 2.94** | 5.79* | 0.12 |
| $\chi_2^2$ | 0.51 | 0.70 | 13.79* | 1.21 | 0.25 |

* Same as Table 3.

**Table 9**
**Estimates of marginal productivities for ASEAN members—expression (10)**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| $NM'_M = \partial NM/\partial M$ | 0.10<br>(9.35) | 0.19<br>(4.40) | 0.21<br>(3.41) | 0.35<br>(5.62) | 0.15<br>(3.28) |
| $R^2$ | 0.86 | 0.67 | 0.65 | 0.87 | 0.75 |
| DW | 1.47 | 0.52 | 0.45 | 0.72 | 0.87 |
| $\chi_1^2$ | 3.34** | 0.06 | 2.36 | 0.09 | 2.08 |
| $\chi_2^2$ | 1.49 | 0.66 | 0.94 | 1.74 | 1.03 |

* Same as Table 3.

the economy, but sectoral differences and externalities are less marked than in the previous three countries.

If we pool data for the five countries, our previous results for the ASEAN region are confirmed. When we estimate equation (5), $\gamma$ takes a value of 1.85 ($t$-statistic is 13.22) for the manufacturing sector, which indicates that the social productivity of factors in the manufacturing sector is approximately 185 percent higher than in the nonmanufacturing sector. The same equation fitted to data from the industry sector reveals that $\gamma = 1.35$ ($t = 20.50$).[22] The estimates of equation (6) indicate that a 10 percent increase in the output of the ASEAN manufacturing sector induces

[22] $R^2$ in the manufacturing equation is 0.60 and in the industry equation is 0.78.

**Table 10**
**Estimates of intersectoral externalities for ASEAN members—expressions (9) and (10)**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| $NM_M = \partial NM/\partial M$ | 0.034<br>(0.067) | 1.38<br>(3.75) | 1.60<br>(5.33) | 1.08<br>(5.52) | 0.94<br>(2.94) |
| $M_{NM} = \partial M/\partial NM$ | 0.10<br>(9.35) | 0.19<br>(4.40) | 0.21<br>(3.41) | 0.35<br>(5.62) | 0.15<br>(3.28) |
| $NM_M/M_{NM}$ | * | 7.26 | 7.62 | 3.08 | 6.26 |

* Since $NM_M$ is insignificant, the ratio *tends* to zero.
Note: Since $NM_M$ and $N_{NM}$ are estimated in two different equations, we cannot establish the significance of the ratio.

a 4.4 percent increase in the output of the rest of the economy; and a 10 percent increase in the output of the overall ASEAN industrial sector causes a 4.8 percent increase in the output of the rest of the ASEAN region.[23]

The estimates of expressions (9) and (10) are shown in Tables 8 and 9, and the summary is in Table 10.[24] The results corroborate our conjecture based on Kaldor's first law, except in Indonesia, where the results indicate a zero impact of the manufacturing sector on the rest of the economy. For the other four countries, there is an important externality from the manufacturing sector to the rest of the economy. The impact in the other direction—from the rest of the economy to manufacturing—is statistically significant, although smaller. These results reveal a clear asymmetry in impacts, with the externality of manufacturing on the rest of the economy three to almost eight times larger than in the opposite direction, thus confirming the hypothesis of larger spillovers from the manufacturing sector to the rest of the economy than in the reverse direction (Table 10). For Indonesia, we observe that the marginal externality from the rest of the economy to the manufacturing sector is

23 As in the case of the individual time-series equations, the last two terms of expression (6) are highly correlated, and the estimates of $\delta$ are very imprecise. For this reason, the equations were estimated without the product term, $(\delta' - \theta)$.

24 These results are marginal productivities. Therefore, they indicate, for example (see Table 8), that an increase of one unit in Malaysia's manufacturing output induces an increase of 1.38 units of nonmanufacturing output ($NM_M$).

**Table 11**
**Estimates of intersectoral elasticities for ASEAN members—expressions (9) and (10)**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| $\varepsilon_M$ | 0.08 (0.8) | 0.45 (6.95) | 0.49 (5.04) | 0.15 (2.45) | 0.24 (2.35) |
| $\varepsilon_{NM}$ | 0.97 (5.23) | 0.75 (2.70) | 0.55 (3.03) | 0.23 (0.77) | 0.74 (4.11) |
| $\varepsilon_M/\varepsilon_{NM}$ | * | 0.60 | 0.89 | ** | 0.32 |

* Since $\varepsilon_M$ is statistically insignificant, the ratio *tends* to zero.
** Since $\varepsilon_{NM}$ is statistically insignificant, the ratio *tends* to infinity. Besides, since the two parameters are derived from two different equations, we cannot calculate their statistical significance.

small but statistically significant.[25] Finally, it is important to notice that, among the four countries where the ratio is greater that one, Singapore shows the lowest differential. This would confirm the results found with Feder's model. Again, this is due to the fact that, in the other three less developed economies (Malaysia, the Philippines, and Thailand), the marginal productivity of the nonmanufacturing sector (i.e., $M_{NM}$) is, relatively speaking, much lower than that of the manufacturing sector (i.e., $NM_M$). It is expected that, as countries develop, this differential across sectors will decrease.[26] If we pool data for the five countries and fit the two models, we find that the two marginal productivities are $NM_M$ = 0.93 ($t$-statistic is 8.05) and $M_{NM}$ = 0.087 ($t$-statistic is 8.94). This indicates that the marginal externality effect of manufactures on nonmanufactures is almost eleven times larger than in the opposite direction, once again confirming the positive role of manufactures as inducer of externalities in ASEAN members.[27]

[25] In equation (9) the marginal productivity of nonmanufacturing capital was negative for Indonesia, and the marginal productivity of nonmanufacturing labor was negative for the Philippines and Singapore. In the case of equation (10), the marginal productivity of manufacturing labor was statistically insignificant in all five countries, and for this reason the equations were reestimated without this term.

[26] The last two terms in (9) and (10) are weakly exogenous for $NM_M$ and $M_{NM}$, respectively. Also, when the equations are estimated recursively, $NM_M$ and $M_{NM}$ tend to be quite stable for the period analyzed.

[27] $R^2$ in the first model is 0.43 and $\chi_1^2 = 12.57$ and $\chi_2^2 = 19.36$. For the second model, $R^2 = 0.70$, $\chi_1^2 = 0.83$ and $\chi_2^2 = 1.59$.

A further aspect of interest is that equations (9) and (10) allow us to estimate the intersectoral elasticities, as opposed to marginal productivities. This can be done by estimating the terms,

$$\varepsilon_M = \frac{M}{NM} NM_M \qquad \varepsilon_{NM} = \frac{NM}{M} M_{NM}.$$

Then, the right-hand-side variables in equations (9) and (10) are now the growth rates of the stock of capital, the labor force and the other sector's output. The results are shown in Table 11.[28]

If we pool data for the five countries, the results confirm those in Table 11, that is, $\varepsilon_M = 0.27$ ($t$-statistic is 7.36), and $\varepsilon_{NM} = 0.55$ ($t$-statistic is 6.32). The interest of these results resides in that, except for Singapore where $\varepsilon_{NM}$ is insignificant, we now find that the elasticity of the non-manufacturing sector on the manufacturing sector is larger than in the opposite direction (i.e., $\varepsilon_{NM} > \varepsilon_M$). This is the reverse result of the one found estimating the marginal productivities (i.e., $NM_M > M_{NM}$) and appears to be a paradoxical result. This finding leads us to conclude that Kaldor's first law (within the framework of the arguments advanced earlier) is *consistent*, in the sense that it appears corroborated with the notion of marginal productivity but not with that of elasticity. This result has an intuitive and simple explanation. The ratio $\varepsilon_M / \varepsilon_{NM}$ equals the following expression:

$$\frac{\varepsilon_M}{\varepsilon_{NM}} = \frac{M^2}{NM^2} \frac{\partial NM/\partial M}{\partial M/\partial NM} = \frac{M^2}{NM^2} \frac{NM_M}{M_{NM}}.$$

Since manufacturing output (i.e., $M$) is smaller than that of the rest of the economy (i.e., $NM$), $M^2/NM^2$ will be smaller than one. Then, even though the ratio of marginal productivities is larger than one, when it is multiplied by the ratio of the shares (squared), the product will be smaller than the ratio of marginal productivities. The question is, therefore, whether one effect offsets the other one. When the size of the manufacturing sector is very small with respect to the rest of the economy, no matter how large the marginal productivity of the former is, it may not be enough to generate externalities (i.e., measured in elasticity terms). In other words, the industrialization process must reach

[28] In the equation for $\varepsilon_M$, $R^2 = 0.46$, $\chi_1^2 = 14.91$. $\chi_2^2 = 20.74$. In the equation for $\varepsilon_{NM}$, $R^2 = 0.75$, $\chi_1^2 = 7.07$, $\chi_2^2 = 0.87$.

**Table 12**
**Minimum share of the manufacturing sector (i.e., $M$ (%)) in the total economy for $\varepsilon_M/\varepsilon_{NM} > 1$**

| | Indonesia | Malaysia | Philippines | Singapore | Thailand |
|---|---|---|---|---|---|
| $NM_M/M_{NM}$ | — | 7.26 | 7.62 | 3.08 | 6.26 |
| M (%) | — | > 27.0 | > 27.0 | > 37.0 | > 29.0 |

For Indonesia, since $NM_M$ is zero, this calculation is meaningless.

a minimum critical mass for the manufacturing sector to have a positive impact on the rest of the economy.[29] Given the results of the estimates of intersectoral externalities in Table 10, we can calculate the minimum size of the manufacturing sector, that is, the share in the total economy (i.e., $M$(%)), so that $\varepsilon_M/\varepsilon_{NM} > 1$. The results are shown in Table 12. Two interesting conclusions can be drawn from these results. First, that Malaysia, Philippines, and Thailand have achieved the threshold in 1992 (i.e., see Table 2, row $Y_{MA}/Y$). And second, that Singapore's threshold is much higher than that of the other countries.[30]

Also, given that when we pooled data for the five countries we found that the ratio of marginal productivities for the overall ASEAN region was 10.68 (i.e., $NM_M = 0.93$; $M_{NM} = 0.087$), the minimum share of the manufacturing sector in the ASEAN region must be 0.23 for $\varepsilon_M/\varepsilon_{NM} > 1$.

We can now analyze the relationship between expressions (1), Kaldor's original equation, and (9), the extended model derived from the production function. The estimate $b$ in Kaldor's model (1) can be interpreted as an elasticity in a misspecified model (omitted variables). Or, expressed in different terms, Kaldor's model is *nested* within equation (9). The zero restrictions on the other two parameters of (9), that is, the elasticity of the stock of capital and of the labor force of the

[29] In general we will find $\varepsilon_M < \varepsilon_{NM}$, and the smaller the share of manufactures in the total economy, the larger the difference will be. For example, if manufacturing represents around 30 percent of total output (i.e., $M/NM = 0.3/0.7 = 0.42$), the ratio of marginal productivities $NM_M/M_{NM}$ should be larger than 5.5 in order to conclude that $\varepsilon_M > \varepsilon_{NM}$. If, however, manufacturing represents only 20 percent of total output, $NM_M/M_{NM}$ must be larger than 16 in order to conclude that $\varepsilon_M > \varepsilon_{NM}$.

[30] However, if the result in Table 11 is true, i.e., $\varepsilon_{NM} = 0$, $\varepsilon_M > \varepsilon_{NM}$ for Singapore, despite the fact that still in 1992 the share of manufacturing was well below 37 percent.

nonmanufacturing sector, have to be tested. In our case, they are rejected in the cases of Malaysia, the Philippines, and Singapore, but cannot be rejected for Indonesia and Thailand. Therefore, Kaldor's equation (1) is not the correct framework in which to analyze the impact of intersectoral externalities, because in general it is a misspecified model unless the zero restrictions on the other parameters are rejected. Likewise, in the specific cases analyzed, and given our reinterpretation of Kaldor's first law in equations (9) and (10) in terms of elasticities, we find $\varepsilon_{NM} > \varepsilon_{M}$, when, in fact, one should expect the opposite result.

One final relevant aspect in this discussion is whether the distinction between marginal productivities and elasticities is important, because both are similar concepts that provide us with information at the *margin*. Which one is relevant is difficult to ascertain, since Kaldor only stressed the fact that the relationship between nonmanufacturing and manufacturing growth was strong. What we have found in this paper is that, for the group of countries analyzed, the relationship in the other direction, that is, from nonmanufacturing to manufacturing is much stronger when measured in terms of elasticities (i.e., except for Singapore), despite the fact that in Kaldor's analysis it is implicit that the direction of causation is from manufacturing to nonmanufacturing. Only if we use marginal productivities as a measure of externalities do we find clear evidence in the sense stressed by Kaldor (i.e., except for Indonesia). Hypothesizing that what Kaldor had in mind was probably an elasticity, and that according to our reinterpretation the law implies that the relationship in the direction used by Kaldor had to be stronger than in the opposite direction, we must conclude that, for the countries analyzed, the mechanism of externalities between the manufacturing and nonmanufacturing sectors proposed by Kaldor's first law, did not work, or worked in a different fashion. The manufacturing sector needs to achieve a minimum critical size for Kaldor's law to be *true*; otherwise, at least for the case of the developing countries analyzed, the externalities from the rest of the economy to the manufacturing sector are larger than those in the direction hypothesized by Kaldor. Certainly it is obvious to conclude that, for the manufacturing sector to generate externalities, it must achieve a minimum size. The result that we wish to point out, however, is that, for the Southeast Asian countries analyzed, with the exception of Indonesia, while $\varepsilon_{M} > 0$ and significant, as hypothesized by Kaldor, there have been very important externalities from the nonmanufacturing sector of the economy to the manufacturing sector, larger than in the direction hypothesized by the law. These results indicate that the role of the manufacturing sector as the "engine of growth" is not evident and unquestionable, and "suggest that the law may be largely illusory and does not warrant the emphasis that has been placed on it" (McCombie 1982, p. 282). To stress the argument. Finding $\varepsilon_{NM} > \varepsilon_M$ is not taken to imply that we refute Kaldor's first law, that there is a strong positive correlation between GDP growth and manufacturing growth. In fact, regressing overall growth on manufacturing growth yields significant coefficients in all five cases. This result is available upon request. It undermines Kaldor's first law and poses a question, however, under our reinterpretation, according to which externalities from manufacturing to nonmanufacturing should be higher than in the opposite direction.

## Summary and conclusions

We have revisited Kaldor's first law, namely, that there is a strong correlation between nonmanufacturing output growth and manufacturing output growth. We have proposed two structural frameworks to test this relationship, and tested them using time series for Indonesia, Malaysia, the Philippines, Singapore, and Thailand for the period 1967–92.

The results confirm the important role of the industrial sector, and in particular of manufactures, in the generation of growth in the Southeast Asian economies analyzed. When we applied Feder's framework, we concluded that the manufacturing sector is clearly more efficient than the rest of the economy using resources (140 percent to 280 percent), except in Indonesia. In the second structural framework, estimating separately the *marginal productivities* of the manufacturing and nonmanufacturing sectors of the economy, we concluded that the former were clearly higher than the latter, three to eight times, except, again, for Indonesia. When we pool data for the five ASEAN member countries, our results indicate that the manufacturing externality is ten times larger than the nonmanufacturing externality. It appears that intersectoral differences in productivity, as well as externalities from the manufacturing to the nonmanufacturing sector of the economy, are small at very low levels of development, owing to the small size of the secondary sector and to the lack of integration among the different sectors of the economy. These differences increase when the country develops and tend to decrease again when the country reaches the stage of maturity, that is, once it exhausts the possibilities of transferring resources from the less to the more productive sectors.

One important finding of this paper is that our reinterpretation of

Kaldor's hypothesis about the externalities provided by the manufacturing sector—that is, that the externality of the manufacturing sector on the nonmanufacturing sector is larger than in the opposite direction—appears to be consistent when these are measured in terms of marginal productivities but not when they are measured as elasticities, which is how the parameter $b$ in Kaldor's equation (1) has traditionally been interpreted. If we interpret and estimate the externalities as elasticities, then we find that they are much stronger in the direction of the nonmanufacturing sector to the manufacturing sector. Therefore, we conclude and agree with McCombie (1982, p. 292) in his analysis of Kaldor's first law, that probably "the relationship is more complex than would seem from the simple bivariate regression estimated by Kaldor."

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