European Research Studies Journal
Volume XXII, Issue 1, 2019

pp. 112-127

The Role of Manufacturing and Service Sectors in Economic Growth: An Empirical Study of Developing Countries

Submitted 10/2/19, 1st revision 17/2/19, accepted 22/2/19

Eman Attiah[1]

Abstract:

Historically, manufacturing has played a key role in the economic development of developing countries. The experience of countries like India, which invested in services, and the failure of industrialization in Africa and Latin America have led to skepticism about the effectiveness of manufacturing to foster development.

The paper examines the role of manufacturing and service sectors in economic development in the period (1950-2015). It presents raw data from 50 countries, 10 advanced economies and 40 developing countries.

The results of the empirical analysis are in line with the manufacturing engine of growth hypothesis. The share of manufacturing of GDP is positively related to economic growth and this effect is more pronounced for the poorer countries, no such effects were found for services.

The analysis of the role of manufacturing and service sectors in periods of growth acceleration show that the effects of manufacturing are particularly pronounced in periods of growth acceleration. The tentative conclusion is that manufacturing is especially important in periods of accelerated growth. Services also play a role in growth accelerations, but less important than manufacturing.

Keywords: *Manufacturing, service sector, growth acceleration, economic development.*

[1]*Beirut Arab University, dept. of Economics, e.atia@bau.edu.lb*

1. Introduction

In the older development economics literature, there was a near consensus that manufacturing was the high road to development. Success in economic development was synonymous with industrialization. Recently In advanced countries, services sectors account for over two thirds of GDP in advanced countries. This alone gives the services sector a heavy weight in economic growth. In developing countries, the share of services is also substantial. It is now argued that services sectors such as software, business processing, finance or tourism may act as leading sectors in development and that the role of manufacturing is declining in developing economies. The prime exemplar for this is India since the 1990s. Other authors argue that it is not manufacturing that is important, but subsectors of manufacturing such as ICT**.** (Fagerberg and Verspagen, 1999). On the other hand, the East Asian experience documents the key role that industrialization has played in the economic development of developing countries in the past sixty years. All historical examples of success in economic development and catch up have been associated with successful industrialization (Szirmai, 2009).

This research tries to examine the role of manufacture and service sectors empirically, analyzing a dataset of 50 countries, including 10 advanced economies and 40 developing countries, covering the period 1950-2015. The focus of the analysis is on the 'Engine of Growth Hypothesis' which posits that manufacturing is the key sector in economic development. The research examines the questions as how important manufacturing and services have been in growth and catch up in developing countries in the post-war period and what can we learn from these experiences about the future role of manufacturing and services in economic development?

The research is structured as follows. Section 2, introduce briefly the role of industrialization in the economic development, and discuss the role of industrialization in structural change of developing countries, The theoretical and empirical arguments for the Engine of Growth hypothesis are summarized in section 3, section 4 review some of contributions in the literature, section 5 the research questions and hypotheses, while data and methods of analysis are discussed in section 6 and section 7 concludes the article.

2. Industrialization and Economic Development

Since the industrial revolution, manufacturing has acted as the primary engine of economic growth and development. Great Britain was the first industrialized country and became the technological leader in the world economy. From Great Britain manufacturing diffused to other European countries such as Belgium, Switzerland, and France and later to the United States. Which followed a radically different path towards industrialization based on primary exports, abundance of land and natural resources, and scarcity of labour (Crafts, 1977; Bergier, 1983; Pollard,

1990; Von Tunzelmann, 1995). Famous latecomers to the process of induztrialisation were Germany, Russia and Japan, they profit from the availability of modern technologies developed in the leading industrial economies, without bearing all the risks and costs involved in research and development (R&D) (Gerschenkron, 1962). Technological developments had increased the productivity and the scale of manufacturing production in the nineteenth century.

Industrialization should be a single global process in which the industrial mode of production has diffused across the globe. Individual country experiences with industrialization can only be understood as part of this global and ongoing process of technological diffusion. But this does not mean that country experiences are identical. Individual countries follow different paths of industrial development depending on their initial conditions and the moment of their entry into the global race for industrialization (Pollard 1990).

In developing countries, moves towards industrialization were scarce and hesitant. Towards the end of the nineteenth century, one finds such beginnings in Latin American countries such as Brazil, Argentina, Chile, and Mexico, and large Asian countries such as India and China. But developing countries still remained predominantly dependent on agriculture and mining. Lewis (1978a and 1978b) has argued that the shear profitability of primary exports was one of main reasons for the specialization of developing countries in primary production. But colonial policies also played a negative role. For instance, in India and Egypt textile manufacturing suffered severely from restrictive colonial policies which favored production in Britain.

Whatever the reasons, the groundswell of global industrialization, which started in Great Britain in the eighteenth century, swept through Europe and the USA and reached Japan and Russia by the end of the nineteenth century, subsided after 1900 (Pollard, 1990). With a few exceptions, developing countries were bypassed by industrialization.

2.1 Manufacturing and structure change

The traditional patterns of structural change refer to the rise of industry sector precedes the services sector (Chenery, 1979). The pattern of structural change in developing countries differs radically from the traditional patterns of structural change. The shares of agriculture, industry, manufacturing and services for the sample of developing countries. During the period 1950- 2015 (UN, Yearbook of National Accounts Statistics), show the following:

- In 1950, 41 per cent of developing country GDP originated in the agricultural sector the average share of industry 30%, services sector 40%, and higher than the total share of industry. And the average share of manufacture 11%. The share of industry much higher than one would expect for countries that are just

embarking on a process of industrialization. with some exceptions like Tanzania (3%), Nigeria (2%) and Sri Lanka (4%). Latin America is by far the most industrialized region in 1950.

During the period (1950- 1980): The average share of manufacturing increased in all developing countries, peaking at around 20 per cent in the early eighties.

Between (1980-2015): The share of manufacturing continued to increase in many Asian economies, but there were processes of deindustrialization in Africa and Latin America (24%-16%).

In the advanced economies: The share of service sector of GDP increased substantially from 34% in 1950 to 72% in 2015. In comparative perspective we observe a long-run increase in the shares of manufacturing in developing countries and a long-run contraction in the shares of manufacturing in the advanced economies.

2.2 The Importance of Manufacturing in Economic Development

There are a lot of theoretical and empirical evidence for the importance of industrialization for economic development which can summarize in the following points:

1- The manufacturing sector offers special opportunities for capital accumulation. Capital accumulation is one of the aggregate sources of growth (Szirmai, 2009). It is much lower in agriculture and services; thus, an increasing share of manufacturing will contribute to economic growth.
2- The manufacturing sector offers special opportunities for economies of scale, which are less available in agriculture or services (fagerberg and verspagen, 1999), (Kaldor, 1966, 1997).
3- The manufacturing sector offers special opportunities for technological progress (Cornwall, 1977). Technological advance is concentrated in the manufacturing sector and diffuses from there to other economic sectors such as the service sector. The capital goods that are employed in other sectors are produced in the manufacturing sector. It is also for this reason that in the older development economics literature the capital goods sector - machines to make machines - was given a prominent role.
4- Linkage and spillover effects refer to the direct backward and forward linkages between different sectors and subsectors create positive externalities to investments in given sectors (Cornwall, Tregenna, 2007) are stronger in manufacturing than in agriculture or services Productivity is higher in the manufacturing sector than in the agricultural sector. The transfer of resources from agriculture to manufacturing provides a structural change bonus.

So, there is a positive relation between the degree of industrialization and per capita

income in developing countries. The developing countries which now have higher per capita incomes have seen the share of manufacturing in GDP and employment increase.

In many service sectors, the possibilities for productivity growth are limited due to the inherently labour intensive nature of service production. This implies that an increasing share of services results in a productivity slowdown (Baumol's law). Such service sectors include personal services, restaurants and hotels, health care and medical services and government. What productivity improvement there is, often takes the place of reducing quality of output or simply providing less services for the same price, so it should not show up in productivity indices if these were correctly measured using hedonic price indices. Baumol's law has recently come under fire, because there are some very important market service sectors such as the financial sector and sales and distribution where there are major productivity improvements, based on ICT technologies.

Nevertheless the working hypothesis is that a country with a large service sector will tend to grow slower than a country with a smaller service sector. As advanced economies are predominantly service economies, this creates new possibilities for catch up in developing countries where the industrial and the manufacturing sector have a proportionately larger share in output.

On the other hand, developing countries are characterized by a very large share of the service sector at early stages of development. They did not follow the traditional linear sequence of a shift from agriculture to manufacturing, followed by a shift from manufacturing to services. As much of the large service sector in developing countries is accounted for by a large, inefficient and unproductive sector of government services, developing countries suffer from a structural.

Change burden at early stages of development. Because the demand for services increases at higher level of incomes. As per capita incomes increase, the demand for services may increase. But for services that are not traded internationally, (Chakravarty and Mitra, 2009 the increasing demand for services may be more a consequence of growing income than a driver of growth, this would be an argument for services –led growth at higher level of development.

3. Literature Review

The evidence in the secondary literature is mixed. The older literature tends to emphasize the importance of manufacturing, the more recent literature places finds that the contribution of service sector has increased. Also, in the more recent literature one finds, that manufacturing tends to be more important as an engine of growth in developing countries than in advanced economies and more important in the period 1950-1973 than in the period after 1973.

Fagerberg and Verspagen (1999) regress real growth rates of GDP on growth rates of manufacturing. If the coefficient of manufacturing growth is higher than the share of manufacturing in GDP, this is interpreted as supporting the engine of growth hypothesis. Fagerberg and Verspagen find that manufacturing was typically an engine of growth in developing countries in East Asia and Latin America, but that there was no significant effect of manufacturing in the advanced economies.

In a second article Fagerberg and Verspagen (2002) examine the impact of shares of manufacturing and services on economic growth in three periods: 1966-72, 1973-83 and 1984-95 for a sample of 76 countries. They find that manufacturing has much more positive contributions before 1973 than after. The interpretation in both papers is that the period 1950-1973 offered special opportunities for catch up through the absorption of mass production techniques in manufacturing from the USA. After 1973, ICT technologies started to become more important as a source of productivity growth, especially in the nineties. These technologies are no longer within the exclusive domain of manufacturing but operate in the service sector.

Szirmai (2009) examines the arguments for the engine of growth for a limited sample of Asian and Latin American developing countries. He focuses on capital intensity and growth of output and labour productivity. His results are again somewhat mixed. In general, he finds support for the engine of growth hypothesis, but for some periods capital intensity in services and industry is high than in manufacturing. In advanced economies productivity growth in agriculture is more rapid than in manufacturing.

Rodrik (2009) regresses growth rates of GDP for five-year periods on shares of industry in GDP in the initial year, following the same approach as in this paper, but not distinguishing manufacturing from industry. He finds a significant positive relationship and interprets the growth of developing countries in the post war period in terms of the structural bonus argument. He explicitly concludes that transition into modern industrial activities acts as an engine of growth. But he is rather vague about what he means by modern. It also includes the famous Ethiopian horticulture activities studied by Gebreeyesus and Iizuka (2009). For Rodrik structural transformation is the sole explanation of accelerated growth in the developing world.

Tregenna (2007) analyses the important of manufacturing for South African economic development and concludes that manufacturing has been especially important through its strong backward linkages to the service sector and other sectors of the economy.

For India two papers reach contradictory conclusions. Katuria and Raj (2009) examine the engine of growth hypothesis at regional level for the recent period and conclude that more industrialized regions grow more rapidly. On the other hand Thomas (2009) concludes that services have been the prime mover of growth resurgence in India since the 1990s.

A similar position is taken by Dasgupta and Singh (2006). In an econometric analysis for India Chakravarty and Mitra (2009) find that manufacturing is clearly one of the determinants of overall growth, construction and services also turn out to be important, especially for manufacturing growth. Is Industry still the engine of growth? An econometric study of the organized sector employment in India (2009)]

Timmer and de Vries (2009) also points to the increasing importance of the service sector in a sample of countries in Asia and Latin America. Using growth accounting techniques, they examine the contributions of different sectors in periods of growth accelerations, in periods of normal growth and in periods of deceleration. In periods of normal growth, they find that manufacturing contributes most. In periods of acceleration, this leading role is taken over by the service sector, though manufacturing continues to have an important positive contribution. Szirmai and Verspagen (2015) tested the relationships between the share of manufacturing and services sectors to GDP and growth of GDP per capita using panel data of developed and developing countries. This relationship was examined for three periods, 1950–70, 1970–90, and 1990–2005.

The results shows that manufacturing acts as an engine of growth for low- and some middle-income countries, provided that they have a sufficient level of human capital. Such growth engine features are not found in the service sector. And indicate that a higher level of human capital is necessary for manufacturing to play a role as an engine of growth in developing countries.

Focusing on middle-income economies, Su and Yao (2016) assess, among others, whether the manufacturing sector drives the growth of the services sector. The results from all three methodologies used for the analysis – long - run Granger causality tests, cross-sectional regression and panel regression - show that manufacturing sector growth drives services sector growth, not the other way around. These findings have led the authors to conclude that manufacturing is indeed the growth engine of economies and, hence, that premature deindustrialization has negative effect on economic growth.

4. Research Questions and Hypotheses

In sum, both the empirical information contained in this paper and the secondary literature presents a somewhat mixed picture. Manufacturing is seen as important in several papers, especially in the period 1950-73 and in recent years more so in developing countries than in advanced economies. In the advanced economies, the contribution of the service sector has become more and more important and the share of services in GDP is now well above 70 per cent in the advanced economies. To guide our empirical analysis, we have formulated a set of working hypotheses which take a strong version of the engine of growth hypothesis as point of view.

1. Is there a positive relationship between the share of manufacturing to GDP

and growth of GDP per capita?
2. Is there a positive relationship between the share of services to GDP and growth of GDP per capita?
3. Is the relationship between the share of manufacturing to GDP and per capita growth is stronger than between the share of services and growth?
4. Is there a positive relationship between the share of manufacturing and the rate of growth during growth accelerations?
5. Is the relationship between the share of manufacturing and growth during growth accelerations stronger or weaker than that between the share of services and growth?

5. Data and Methods

This section discusses the sources of data and the variables of the empirical study. The World Bank World Development Indicators (WDI) for the value shares at current prices of major sectors. Industry, manufacturing and services for missed data at (WDI) before 1970 the UN national accounts are used. Barro and Lee (2000) for human capital dataset for average years of education for the population of above fifteen years of age and UNESCO publications.

The research will estimate a panel regression model**.** The dependent variable is growth of GDP per capita per five year period. The independent variables are the shares of manufacturing and services in GDP measured by the share of manufacturing and services of value added in GDP, (man), (sr). GDP per capita relative to the US (Gus). Education level (ed) and time-intercept dummies for each of the 13 five-year time periods between 1950 and 2015 the models will be estimated with fixed, between and random effects methods on the same data, the form of the regression equation for a Random effect Model will be as follows:

$$git = ci + BXit + Eit$$

where *g* is the growth rate, c is a constant, Xit vector of explanatory variables, B is the vector of coefficients that we want to estimate, Eit the usual disturbance term, and *i* and *t* are subscripts denoting country and time period, respectively.

Fixed effect Model: This approach is known as the within approach.
The term refers to the fact that this form looks at variation within countries

$$(git-g) = ci + B(Xit-X) + sit$$

Subtracting the country averages (indicated by a bar (-) above a variable). The estimated coefficients (B) will only capture the variation over time, within countries.

Between effect Model: The between approach is implemented as a regression that uses the average values of the variables in formal terms:

g = y+f Xi+e

The between effect and Fixed effect Models are complementary to each other, rather than substitutes. The random effects model be a hybrid form that combines the within and between models, because it does not apply any transformation of the data the coefficients that are estimated in the random effects model consider both the variation between countries, and the variation within a country (over time). Table 1 shows the descriptive statistics of the variables used.

Table 1. *Descriptive statistics*

Variable	Average	Standard Deviation	Within Standard Deviation	Between Standard Deviation
Growth rate	2.32	3.06	2.7	1.38
Manufacturing share	17.5	8.6	4.91	7.03
Services share	48.4	12.3	7.41	10.4
Education level	4.9	2.91	1.28	2.61
GDP per capita relative to US level	0.31	0.29	0.075	0.29

6. Results

To test the first and second hypothesis, the model estimated on the complete sample (455observations, 50 countries) and present the basic random effects (re), fixed effects (fe) and between (be) specifications below in Table 2.

Table 2. *Determinants of economic development (1950-2015)*

Variable	**Fe**	**Be**	**Re**
man	0.32	*0.061	**0.046
Ser	0.026	0.017	0.016
gdrus	***-6.859	**-2.27	***-2.93
edu	0.040*	**0.29	***0.31
period 2	-0.89	10.28	***-1.02
Period 3	0.34	***20.25	-0.04
Period 4	0.51	-6.75	0.14
Period 5	0.078	***-14.72	-0.46
Period 6	-0.167	-6.13	-0.77
Period 7	***-2.427	**-14.32	***-3.162
Period 8	**-1.6	**-2.43	***-2.26
Period 9	**-1.38	-5.92	***-2.19
Period 10	-1.253	**-13.85	***-2.192
Period 11	-0.95	-8.24	***-1.9
Period 12	**-941	-7.51	***-1.5
Period 13	531-	*452-	247**-
Constant	**3.17	**10.72	1.62
R2	0.31	0.78	0.22

Note: **significant <1% ** significant <5% *** significant <10%*

The share of manufacturing in GDP (man) is significant in the (re) and (be) estimations; it is not in the (fe) estimation. That (man)does not perform in the (fe)regression has to do with the correlation between general country effects and manufacturing shares and the modest degree of within country variation of manufacturing shares in all subsequent specifications, manufacturing performs least in the (fe) models. The share of services in GDP (ser) is never significant. Education (edu) or human capital is significant in the (re) and (be).

The coefficient of country GDP as a percentage of US GDP per capita (gdurs) is negative and significant in all models. The negative coefficient indicates that countries with a larger gap relative to the USA are growing more rapidly than countries closer to the USA. The time dummies in the (re) specification indicate that average growth was lower after 1980, period (6) than before this year. The basic run is in line with the industry engine of growth hypothesis.

The initial results show that 10 %-point increase in the share of manufacturing raises growth by about 5% point. Although this effect of manufacturing on growth is far from negligible, the size does not correspond to the effect that one would associate with an industrialization-based growth spurt in some newly industrializing countries, (Fagerberg and Verspagen, 1999). This is not surprising, since our model points to a linear relationship between the share of manufacturing and the growth rate, i.e., an increase of manufacturing from a low base-level has the same effect on the growth rate as an increase in manufacturing in a highly industrialized economy. In order to be able to capture the effect of industrialization on development in a broader way.

The next step is to include an interaction term between (man) and (gdrus) (man*gdrus). A similar interaction term for (man) and (edu) (man*edu) this variable reflects the ability of nation to observe the new technology in manufacture sector. Later interaction term for (ser) and(gdurs) (ser*gdurs) will be added the estimation results are presented below in tables (3), (4) and (5).

Table 3. *Determinants of economic development with interaction between (Manufacturing and USA income gap)*

variable		**Fe**		**Be**		**Re**
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
man	0.74	*	0.11	**	0.099	***
ser	0.023		-0.027		0.009	
gdrus	-4.61	*	0.143		0.161	
edu	0.023		0.291	**	0.361	***

men*gdrus	-0.12		-0.13		-0.162	***
Per 2	-0.88		-11.42		-1.003	***
Per 3	0.34		-19.92	***	-0.015	
Per 4	0.51		-5.91		0.16	
Per 5	0.049		-13.72	**	-0.46	
Per 6	-0.231		-7.52		-0.81	*
Per 7	-2.5	***	-13.52	***	-3.22	***
Per 8	-1.67	**	-3.09		-2.35	***
Per 9	-1.47	**	-5.99		-2.52	***
Per 10	-1.33		-12.52	*	-2.31	***
Per 11	-0.99		-8.91		-1.92	***
Per 12	-0.81		-7.82		-1.72	***
Pre13	0.7-		6.5-		0.9	**
Constant	2.71	*	10.52	**	1.78	

Note: **significant <1% ** significant <5% *** significant <10%*

In random effects model, the interaction term manufacturing is significant with a negative sign. This suggests that manufacturing has a more positive impact on growth at low levels of USA income gap, and a more negative impact at high levels of USA income gap. The coefficient of USA income gap becomes non-significant. The results concluded that the effect of manufacturing on growth is stronger for the poorest countries with the largest income gaps.

Table 4. *Models with Interaction Terms between Shares of Both Services and Manufacturing and the USA Income Gap*

Variable		**Fe**		**Be**		**Re**
	Coef	Sig	Coef	sig	Coef	Sig
Man	0.081	*	0.112	**	0.96	***
Ser	0.042		-0.04		0.035	
Gdrus	-0.32		-4.91		1.81	
Edu	0.012	*	0.028	*	0.057	***
man*gdrus	-0.15	*	-0.103		-0.161	***
man*edu	0.025	**	0.053	*	0.068	***
Ser* gdrus	-0.058		0.81		-0.32	
Per 2	-0.85	**	-13.5		-0.99	***
Per 3	0.37		-22.6	***	-0.01	
Per 4	0.61		-5.52		0.175	
Per 5	0.13		-14.64	***	-0.43	
Per 6	-0.15		-8.51		-0.81	
Per 7	-2.4	***	-15.20	**	-3.172	***
Per 8	-1.55	***	-4.31		-2.271	***
Per 9	-1.31	*	-8.41		-2.2	***
Per 10	-1.16		-13.72		-2.21	***
Per 11	-0.82		-10.41	**	-1.84	***
Per 12	-0.73		-9.59		-1.35	***
Per 13	013-		8.5-	**	1.8-	*

Constant	2.91		12.41	***	0.851	

Note: **significant <1% ** significant <5% *** significant <10%*

Finally, the results as shown in Table 4 show:

In the random effects model, neither (ser) nor (ser*gdurs) are significant, both (man) and (man*gdurs) are significant.

Manufacturing has a positive effect on growth and this effect is more pronounced for the higher education nations (man* edu) is significant in all models .but (edu) is non-significant .The coefficients of (man) and (man*gdurs) are similar to those in the previous estimation without (ser*gdurs).

Thus, the initial findings are in line with the engine of growth hypothesis. Manufacturing has a positive effect on growth and this effect is more pronounced for the less developing and higher education countries.

6.1 Growth accelerations

This section, examined the role of manufacturing and services sectors during growth acceleration periods and whether manufacturing contributes more to growth in periods of acceleration. Hausmann *et al.* (2005) use three conditions to define a growth acceleration.

The first is that the growth rate must be high (specifically, >3.5% per year, measured over an 8-year forward period).

The second is that growth must accelerate (specifically, at a point in time t, the growth rate over the next 8 years must be 2.0% higher than the growth rate over the previous 8 years).

Third, the level of GDP per capita at the end of the growth acceleration must be higher than the pre-acceleration peak.

This research applies the second condition only to the start-year of a growth acceleration. For years following this start year, and check the first and third condition, dummies variable will added during growth acceleration period for both manufacturing, (d*man) and services, (d*ser) and estimated the effects of manufacturing and services separately in the following two Tables 5 and 6.

Table 5. *Model Slope Shift Dummies for Manufacturing During Growth Accelerations*

Variable		**Fe**		**Be**		**Re**
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Man	0.031		0.026		0.001	

Ser	0.032		0.016		0.021	
d*man	0.097	***	0.113	***	0.171	***
Gdrus	4.46-		0.031		0.511	
Edu	0.141-		0.182	***	0.201	
Mangdrus	0.059-		0.061-		0.017	
Per 3	0.560		0.592	***	11.412-	
Per 4	0.710		0.692		0.000	
Per 5	0.341		0.321		13.011-	***
Per6	0.193		0.0511		1.421-	
Per 7	1.96-	***	2.311-	***	5.691-	
Per8	0.912-	*	1.610-	***	4.510-	
Per9	0.617	*	10121-	***	3.031-	
Per10	0.451-		1059-	**	1.91-	
Per11	0.011		0.711-		10.210-	*
Per 12	0.000	*	0.032		3.251-	
Per 13	0.002		0.004		2.351	
Per 2	0.378-				5.351-	
constant	3.119		0.611		6.992	

Note: **significant <1% ** significant <5% *** significant <10%*

In this Table the coefficients of (dman) are significant in all models, while the coefficient of (man) becomes non-significant. This suggests that the effects of manufacturing are captured by the slope shift dummies. Manufacturing is especially important in periods of rapid growth. The model estimated with dummy variable for acceleration period with services (d*ser) instead of the for manufacturing (d*man) is shown in Table 6.

Table 6. *The Model with Slope Shift Dummies for Services during Growth Accelerations*

Variable		**Fe**		**Be**		**Re**
	coef	Sig	Coef	Sif	Coef	Sig
man	0.041		0.051	**	0.071	***
ser	0.0222		0.005		0.041-	*
d*ser	0.0441	***	0.062		0.070	***
Gdus	5.251-		2.071-		0.180	
Ser*gdus	0.006		0.011		0.019-	
Edu	0.100-		0.191	***	0.242	**
Per 2	0.312-		0.621		7.591-	
Per 3	0.541		1.191	**	9.31-	
Per 4	0.561		1.162		0.001	
Per 5	0.111		0.621		11.121-	*
Per6	0.142		0.591		1.412-	
Per 7	1.899-	***	1.721-	***	6.510-	
Per8	0.912-	*	0.631-		4.321-	
Per9	0.811-	*	0.610-		3.111-	
Per10	0.462-		0.411-		2.321-	
Per11	0.011		0.010		7.422-	

Per 12	0.000		0.3.		3.511-	
Per 13	0.003		0.02		4.25-	
constant	3.011		0.007		6.321	

Note: **significant <1% ** significant <5% *** significant <10%*

The model shows a similar pattern. The coefficient of services becomes non-significant or negative. The coefficient of the interaction term is significant in all three specifications. Thus, services contribute positively to growth in periods of growth accelerations the coefficients for (d*ser) are much smaller than those for (d*man), in Table 4 suggesting that the role of manufacturing during growth accelerations is more important than that of services. It is interesting to note that the coefficients of manufacturing are significant in the random effects and between models with the interaction term for services. This confirms the general importance of manufacturing. The tentative conclusion of this section is that manufacturing is especially important in periods of accelerated growth. Services also play a role, but are less important than manufacturing. This conclusion is consistent with our hypotheses 4 and 5. It contrasts with that of Timmer and de Vries (2009), who argue that it is services that are especially important during growth accelerations.

7. Conclusions

This paper addresses the question of the role of manufacturing and service sectors for economic development. In the older development economics literature, there was a near consensus that manufacturing was the high road to development. Success in economic development was synonymous with industrialization. This consensus now seems to be unraveling. In advanced countries, service sectors account for over two thirds of GDP. This alone gives the service sector a heavy weight in economic growth. In developing countries, the share of services is also substantial. It is now argued that services sectors such as software, business processing, finance or tourism may act as leading sectors in development and that the role of manufacturing is declining in developing economies. The prime exemplar for this is India since the 1990s.

This paper analyzed a panel data of 50 countries, 10 developed and 40 developing countries for the period (1950-2015) and regressed five-year growth rates on the share of manufacturing and service sectors of GDP, with other control variables to test the hypothesis of engine of growth.

The results of the empirical analysis in this paper are in line with the engine of growth hypothesis. For the whole sample, the share of manufacturing is positively related to economic growth and this effect is more pronounced for the poorer countries. No such effects were found for services. These results are consistent with our first two hypotheses concerning the importance of manufacturing. It should be noted, however, that convergence effects are much more important than the effects of the shares of manufacturing.

Finally, the analysis of the role of manufacturing and services sectors in periods of growth acceleration show that the effects of manufacturing are particularly pronounced in periods of growth acceleration. The tentative conclusion is that manufacturing is especially important in periods of accelerated growth. Services also play a role in growth accelerations, but are less important than manufacturing.

References:

Ark, van B. and Timmer, P.M. 2003. Asia's productivity performance and potential: The contribution of sectors and structural change. The Conference Board.

Barro, R.J. and Jong-Wha, L. 2000. International Data on Educational Attainment: Updates and Implications. CID, Working Paper No. 42.

Bosworth, B., Collins, M.S. and Chen, Y. 1995. Accounting for Differences in Economic Growth. Paper for Conference on Structural Adjustment Policies in the 1990s: Experience and Prospects. Institute of Developing Economies, Tokyo, Japan.

Chakravarty, S. and Mitra, A. 2009. Is Industry still the engine of growth? An econometric study of the organized sector employment in India. Journal of Policy Modeling, 31.

Cornwall, J. 1977. Modern Capitalism. It's Growth and Transformation, New York, St. Martin's Press.

Fagerberg, J. and Verspagen, B. 1999. Modern Capitalism in the 1970s and 1980s. In M. Setterfield ed., Growth, Employment and Inflation. Houndmills, Basingstoke, MacMillan.

Fagerberg, J. and Verspagen, B. 2002. Technology-Gaps, Innovation-Diffusion and Transformation: an Evolutionary Interpretation. Research Policy, 31, 1291-1304.

Fagerberg, J., Verspagen, B. 2007. Innovation, Growth and Economic Development: Have the Conditions for Catch-up Changed? International Journal of Technological Learning, Innovation and Development, 1(1).

Hausmann, R., Pritchett, L., Rodrik, D. 2005. Growth accelerations. J. Econ. Growth, 10, 303-329.

Katuria, V. and Raj, S.N. 2009. Is manufacturing an engine of growth in India? Analyis in the post nineties. Paper for the UNU-WIDER/UNU-MERIT/UNIDO Workshop, Pathways to Industrialisation in the 21st Century. New Challenges and Emerging Paradigms, Maastricht 22-23 October.

Lewis, W.A. 1978a. Growth and Fluctuations 1870-1913. London, Allen and Unwin.

Lewis, W.A. 1978b. The Evolution of the International Economic Order. Princeton, Princeton University-Press.

Maddison, A. 2001. The World Economy. A Millennial Perspective. Development Centre Studies, Paris, OECD.

Maddison, A. 2007. Contours of the World Economy. Oxford University Press.

Pollard, S. 1990. Typology of Industrialization Processes in the Nineteenth Century. Harwood, Academic Publishers.

Rodrik, D. 2009. Growth after the Crisis. Harvard Kennedy School, Cambridge, MA.

Szirmai, A. 2009. Industrialisation as an Engine of Growth in Developing Countries, 1950-2005. UNU-MERIT, working paper, 10.

Szirmai, A. 2008. Explaining Success and Failure in Development. UNU-MERIT Working Paper, 13.

Szirmai, A. 2010. Explaining Success and Failure in Economic Development. In D.S. Prasada Rao and B. van Ark ed, World Economic Performance. Past, Present and Future. Elgar.

Timmer, M.P. and Gaaitzen, J. de Vries. 2009. Structural change and growth accelerations in Asia and Latin America: a new sectoral data set. Cliometrica, 3(2), 165-190.

Thomas, J.J. 2009. Why is Manufacturing Not the Engine of India's Economic Growth. Examining Trends, 1959-60 to 2008/9, mimeo.

Tregenna, F. 2007. Which Sectors Can be Engines of Growth and Employment in South Africa? An Analysis of Manufacturing and Services. Paper presented at the UNU-WIDER CIBS Conference on Southern Engines of Global Growth, Helsinki, 7-9 September.

Thomas, T. 2009. Why is Manufacturing Not the Engine of India's Economic Growth. Examining Trends, 1959-60 to 2008/9.

Tunzelman, von N. 1995. Technology and Industrial Progress. Cheltenham, Edward Elgar,

UN. 2017. Yearbook of National Accounts Statistics.