

ECONOMIC GROWTH AND THE MANUFACTURING SECTOR IN PAKISTAN: The Relative Significance of the Domestic and Imported Resource Content

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This study focuses on determining the significance of the imported resource content, the largest consumer of the foreign exchange earnings, relative to the domestic inputs in the large scale-manufacturing sector (LSMS) of Pakistan. The analysis also includes the causal relationship of the major manufacturing sector variables; namely manufacturing employment, investment, and exports, with the economic growth of the country, determined within a unidirectional model. The relative significance of the domestic and imported resource content in the LSMS is determined for thirty 3-digit level industries over a period of 12 years; 1975-1991. The results are obtained by estimating a simultaneous equations model, i.e., applying the 3SLS technique. The findings suggest that the domestic resource content has played a significant role in determining both the output and employment in the LSMS of Pakistan, but the estimated coefficients of the imported resource content variable indicate the absence of a significant relationship with the left hand side variables, LSMS output and employment, respectively.

I. Introduction

The manufacturing sector has a fundamental importance in sustaining and strengthening the growth potential of an economy in the modern world which has witnessed unprecedented pace of technological development. Not only does it directly provide income to the labor force employed in it, but the manufacturing sector is also responsible, through backward and forward linkages [Hirschman (1988)], for the livelihood of a large number of those employed in the primary and tertiary sectors of the economy. In modern times, the development of manufacturing industries has been visibly followed by spectacular economic progress and rising living standards.

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The study has two basic objectives: the determination of the significance of the manufacturing sector in the economic growth of Pakistan, and an estimation of the determinants of the growth rate of the manufacturing sector itself, with particular relevance to the relative significance of the domestic and foreign resource content. The arguments and analyses are structured in six Sections. After giving the introduction in Section I, Section II briefly reflects on the theoretical perspective of the nexus formed by industrial development, productivity growth and competitiveness. Section III provides a performance overview of the manufacturing sector in Pakistan, mainly by reviewing some of the relevant studies conducted on the subject. Section IV provides the information on the data and methodology employed to carry-out statistical analysis, followed by Section V, which presents specific form of models for estimation and, reports results. Section VI discusses major findings and attempts to highlight their implications for industrial policy in Pakistan. Finally, Section VII provides concluding remarks.

II. Theoretical Perspective

The historical experience of developed countries votes in favor of establishing a broad and robust domestic industrial base to help ensure sustained growth, one of the necessary conditions for development. The industrialization process has been widely witnessed to demonstratively increase productive potential of the economy which in turn helps the growth of both output and employment. In the contemporary world, the strategic significance of industrialization goes beyond the domestic domain since a country's economic position in the league table of nations is recognized by its competitiveness in the international market. Indeed competitiveness no longer simply owes to comparative endowments as entailed by the text book lessons on international trade; rather its main thrust is being increasingly derived from consistent and sound industrial development strategies which rely on both technology readiness and innovations.

Economic strength universally remains one of the fundamental public policy goals. In the modern world, the economic power of nations illustrates a uniform pattern inherently involving industrial development, higher productivity, income growth and greater competitiveness, a mutually reinforcing sequential chain of strategic variables proceeding in a circular fashion. However, consistency between different facets of industrialization policy remains critical for enhancing productivity and competitiveness. Literature on industrialization provides valuable insight for intervention targeting. One of the most convincing studies is by Lall (1990), who formulated a coherent framework that included meta-level elements of systemic competitiveness which ensures effective industrial expansion. According to him, in the presence of a conducive macroeconomic environment and sizeable physical infrastructure, industrial development is a function of three strategic factors: incen-

tives, capabilities and institutions.¹ Industrial capabilities, commonly recognized as efficient techniques of production reflected in specialization and high value addition, are universally considered to have enormous significance. This is all the more true in the contemporary era of globalization which has made resource endowment secondary to technological development. The other two factors, incentives and institutions, essentially have a strong relationship with each other where the latter shapes the former.

Finally, industrial development ought to be cushioned by the public policy aiming at approaching, nurturing and augmenting indigenous capabilities by facilitating and strengthening the institutions that help incentivize production, inventions and innovations. The complex nature of the interplay of capabilities, incentives and institution is such that all three must operate simultaneously for the kind of dynamic industrial success which were registered by the newly industrialized countries (NICs) in East Asia.

III. Overview of the Manufacturing Sector

In Pakistan, the share of manufacturing value-added in the gross domestic product (GDP) has remained more or less stagnant, around 17 to 18 per cent in the 34 years upto 2004 (Economic Survey). In spite of recent high growth rates of the sector, 13.4 per cent in 2004, the country is still unable to join the league of industrialized countries, though industrialization has always been in the top list of proclaimed public policy goals.

In the 1950s Pakistan aggressively pursued import substituting industrialization, partly as part of the response to its minuscule industrial base, and partly because the inward looking strategies were in vogue at the time. The contribution of import substitution in total manufacturing output growth was 96.6 per cent during 1951-55, [Khan, (1964)]. The manufacturing units that were established in the early period of industrialization concentrated on light products mainly, textiles, sports goods and surgical instruments. Although the strategy conformed with the universal way of making the transition from traditional society, the initial penchant for production of light consumer goods set the stage for two drawbacks that continue to persist in the industrialization pattern of Pakistan: the neglect of technological development and reliance on imported production inputs.²

¹ The importance of physical infrastructure for industrialization is emphasized also by Hanouz and Yousef (2007). They maintain that quality infrastructure makes the output cost-effective and competitive by lowering the communication, transportation and energy costs.

² The textile industry still remains the single largest determinant of growth in the manufacturing sector. In 2004, textiles accounted for a one-fifth weightage in the quantum index of LSMS and a 46 per cent share in overall manufacturing activity. The share of textiles in export earnings was 68 per cent during 2004 (Economic Survey).

Moreover, the effective rate of protection accorded to the manufacturing sector in Pakistan greatly favors import-based import substitution, as the tariff rates on industrial inputs have always been much lower than the corresponding nominal tariffs. Such a policy results in negative value added in the manufacturing sector, meaning a higher foreign currency value of the imported inputs than the foreign currency value of the output produced.³ Indeed the policy may also have been responsible for aggravating the balance of payments problems of the country by requiring ever increasing quantities of the raw material imports, along with the import of machinery, fuels and even food. This viewpoint finds support from Kemal, (1998) whose findings reveal that value added by the manufacturing output of Pakistan is grossly overstated and, because of the high effective rate of protection and other distortions in the system, the sector only contributes fractionally at world market prices.

Investment in the manufacturing sector of Pakistan soared during the 1960s, but has had a precipitous decline during the nationalization era in the 1970s. By the 1980, the share of private investors in total manufacturing ventures had declined to 34.7 per cent, an alarming outcome of nationalization strategy exhibiting an extremely poor comparison with the corresponding figure close to 96.6 per cent in 1964 [Kemal (1997)].

Indeed, Pakistan's trade and industrial policies have largely swung with the pendulum of dominant development ideas. Therefore, the rising global tide of the neo-classical counter-revolution in the 1980s, made Pakistan revisit its development strategies which tilted towards privatization. During 1995, the private investors had a claim on 81 per cent of the total annual outlay of industrial investment. In more recent years, the privatization has greatly helped revive private investment in the manufacturing sector of the country (Economic Survey).

Pakistan's experience with industrialization is a favorite subject with researchers on the economy. There is voluminous empirical literature available on the subject. As mentioned earlier, Kemal (1998) reported a negative relationship between protection and efficiency. Research has also been conducted on capacity utilization and its major determinants [Kalim (2001a), Pasha and Qureshi (1984)]. Another study by Kalim (2001b) focuses on the employment potential of different categories of the manufacturing sector. Quite a few studies have estimated the production function for quantifying the elasticities of substitution between inputs, mostly capital and labor [Kemal (1981), Battese and Malik [(1987) and (1988)], Khan (1988), Chishti and Mahmood (1991), Khan and Rafiq (1993), Zahid, et al. (1993), and Khan and Burki (1999)]. On the other hand, Khan (1989) reports that capital and

³ In the context of the foreign exchange earning *versus* foreign exchange saving strategies, such an outcome renders the trade and industrial policies of a country both mutually exclusive and self-defying.

imported raw materials are complementary inputs. Ahmad and Idrees (1999) address both substitutability and complementarities between the inputs by focusing on energy and labor which they find complement each other in the early years and become substitutes later, with the degree of substitutability increasing overtime. Finally, two recent studies, Wizarat (2002), and Ara (2005), have focused on the total factor productivity (TFP) in the large scale-manufacturing sector of Pakistan and have reported a decreasing trend overtime.

Although well over half of Pakistan's total import bill has been devoted to the import of industrial raw materials (Economic Survey), none of the studies have made any effort to measure the significance of the foreign resource content in the growth of its manufacturing sector, and hence, its indirect impact on the growth of the country's economy. This very important aspect appears to have strategic significance in a world that has experienced dramatic changes during the last century. In particular, the market place where the products are manufactured, imported, exported, and sold has changed beyond recognition. Contemporaneously, even the technology leader, the United States (US), is struggling to maintain its domestic manufacturing base.⁴

IV. Information on the Data and Methodology

The econometric analysis carried out in this study is based on secondary data. The data sources are the Economic Survey of Pakistan and the Census of Manufacturing Industries (CMI).⁵ The data is taken from various surveys published between 1970-71 and 2001-02, and from the CMI published between 1974-75 and 1990-91. All values utilized in the estimation of the models have been transformed into their real measures using the 1980 base.

Two models have been formulated for estimation. One, for estimating the significance of the manufacturing sector in the economic growth of Pakistan, and the other for estimating the relative significance of the domestic and imported resource content in the development of the manufacturing sector itself. The former is a single equation model. The dependent variable is the growth rate of gross domestic product (GDP). The independent variables for determining the significance of manufacturing sector includes:

⁴ A restrictive policy of domestic content provisions appeared in recent trade bills before the US Congress. Moreover, the prevalent standard of the Federal Trade Commission of the US for using marking or labeling "Made in America" on a product requires that virtually all components and labor originate within the country (<http://www.ftc.gov/opp/jointvent/madeusa/ftp/usa/064.txt>, accessed on November 13, 2005).

⁵ The former is an annual publication of the Economic Affairs Division of the Ministry of Finance in Pakistan, while the latter is published by the country's Federal Bureau of Statistics (FBS).

- gross fixed capital formation (GFCF) in the manufacturing sector,
- employment in the manufacturing sector,
- manufactured exports.

In order to improve the goodness of fit, the model incorporates as independent variables another six major macroeconomic indicators having important implications for GDP growth rate. These variables include:

- the budget deficit,
- foreign remittances,
- real wages,
- the real interest rate,
- money supply (M2),
- a strategic factor.⁶

The real growth rate measures are taken for all variables included in the specific form model. The model utilizes the time-series data from 1970-2002. The data source of all variables is the Economic Survey of Pakistan. The results are obtained by applying the Ordinary Least Square (OLS) technique of estimation on E-view 5.1 computer package.

The second model has been formulated to determine the relative relationship of the domestic and imported resource content with two major endogenous variables of the manufacturing sector, the value of output and the employment level. The model consists of a set of two simultaneous equations, Equation (1) and Equation (2), having manufacturing output and employment as the left hand side variables, respectively. Along with the endogenous variable, the values of the domestic resource content and imported resource content appear as the right hand side variables in each of the two equations. In order to improve the goodness of fit, the per capita income of the economy and the value of industry specific manufacturing exports are incorporated, in Equation (1) and Equation (2), respectively, as two other independent variables.

The real growth rate measures are taken of all variables included in the specific form simultaneous equation model. The model utilizes cross-sectional/time-series panel data of thirty 3-digit manufacturing industries of Pakistan, from 1975-1991. Except for the per capita income, the data source for all variables is CMI. The per capita income measures are taken from the Economic Survey of Pakistan. The results are obtained by applying the 3-Stage Least Square (3SLS) technique of estimation on E-view 5.1 computer package.

⁶ A dummy variable, assigning one to years when Pakistan was receiving significant amounts of foreign aid under the strategic considerations of the donors, and zero to years when the absence of such consideration resulted in drying up of the funds.

V. Models for Estimation and Results

The model for estimating the relationship between the growth of Pakistan's economy and three of its major manufacturing sector variables takes the following specific form:

$$GDP_t = \beta_0 + \beta_1 ME_t + \beta_2 BD_t + \beta_3 \Pi_t + \beta_4 MX_t + \beta_5 FR_t + \beta_6 RW_t + \beta_7 IR_t + \beta_8 MS_t + \beta_9 D_t + U_t$$

where,

- ME = Manufacturing Employment,
- BD = Budget Deficit,
- II = Industrial Investment,
- MX = Manufactured Exports,
- FR = Foreign Remittances,
- RW = Real Wages,
- IR = Interest Rate,
- MS = Money Supply,
- D = Dummy Variable,
- U = Stochastic Error Term.

The specific form of the simultaneous equation model for determining the relative impact of domestic and imported resource content on the manufacturing sector of Pakistan is written as:

$$OV_{it} = \beta_{11} + \beta_{12} EL_{it} + \beta_{13} DI_{it} + \beta_{14} \Pi_{it} + \beta_{15} PC_t + U_{it} \quad (1)$$

$$EL_{it} = \beta_{21} + \beta_{22} OV_{it} + \beta_{23} DI_{it} + \beta_{24} MI_{it} + \beta_{25} MX_{it} + U_{it} \quad (2)$$

$$i = 1, 2, \dots, 30, \text{ and } t = 1, 2, \dots, 12$$

where,

- O = Output Value,
- EL = Employment Level,
- DI = Domestic Input,
- MI = Imported Input,
- PC = Income per Capita,
- MX = Manufacturing Exports,
- U = Stochastic Error Term.

Before estimating the models, a stationarity check was applied on the computed growth rate values of all variables. All of the data series were found to be stationary. The results of the Augmented Dickey Fuller (ADF) Test are reported in Table 1, while Table 2 and Table 3 report the results of the estimated single equation model and the simultaneous equations model, respectively.

The estimated coefficients listed in Table 2 show that all but one variable are significant in the estimated single equation model where GDP growth is the dependent variable. The variable carrying insignificant estimated coefficient, with a negative sign, is manufacturing employment (ME_t) showing that no quantifiable relationship is found between manufacturing employment and the GDP growth rate in Pakistan. Although the size of the coefficient of ME_t is negligibly small, its negative sign may invite theoretical controversy. However, the statistical insignificance of the estimated coefficient helps ignore theoretical implications of the obtained result. The other two manufacturing sector variables are industrial investment, II_t , and manufacturing exports (ME_t). The estimated coefficients of both variables are significant at the 5 per cent level and carry the right signs. Though small in size, the

TABLE 1

Augmented Dickey Fuller Test

Single Equation Model			Simultaneous Equation Model		
Variable	ADF Statistics	Critical Value (10% level)	Variable	ADF Statistics	Critical Value (10% level)
GDP_t	-6.56***	-2.608	OV_{it}	-23.974***	-2.570
ME_t	-7.13***	-2.608	EL_{it}	-23.286***	-2.570
BD_t	-6.13***	-2.608	DI_{it}	-23.305***	-2.570
II_t	-4.51***	-2.608	MI_{it}	-23.306***	-2.570
MX_t	-5.73***	-2.616	PC_t	-34.298***	-2.570
FR_t	-4.75***	-2.608	MX_{it}	-12.757***	-2.570
RW_t	-4.58***	-2.608			
IR_t	-3.44***	-2.607			
MS_t	-5.47***	-2.609			

***Significant at 1 per cent level.

significant estimated coefficients of Π_t and MX_t , with positive signs, *underscore* the importance of Pakistan's manufacturing sector in determining its GDP growth rate. Finally, given that Pakistan's manufactured exports consist of low-tech and low value added products, the result suggests that a doubling of the value, rather than the volume, of manufactured exports will increase GDP by about 1.3 per cent. It is a tempting prospect which requires concerted efforts for technological progress, making it possible to export more downstream manufactured products.⁷

TABLE 2

Economic Growth and the Manufacturing Sector Variables
Estimated Coefficients: Pakistan (1970-2002)

Dependent Variable = GDP_t	No. of Obser vations = 33		
	Variables	Coefficient	t-Statustuc
Constant	3.368***	10.051	
ME_t	-0.006	-0.145	
BD_t	0.003***	11.112	
Π_t	0.035**	2.336	
MX_t	0.013**	2.487	
FR_t	-0.025***	-4.911	
RW_t	0.036*	1.768	
IR_t	-0.125***	-4.565	
MS_t	0.121***	2.770	
D_t	2.577***	3.573	
$R^2= 0.706$	Adjusted $R^2= 0.592$	D.W.= 1.8053	F-statis- tics= 6.16

*Significant at 10% level. **Significant at 5% level. ***Significant at 1% level.

⁷ Presently, more than three quarters of Pakistan's exports are comprised of manufactured goods. Unfortunately, the data, over the period 1974-2003, show that real growth in manufactured exports has a declining trend. Also, high volatility is observed around the trend [see, Ara (2005)].

The coefficients of all other variables turn out to be significant and no theoretical inconsistency is observed regarding their signs. Interestingly, the negative and positive signs of the two monetary variables, IR_t and MS_t , are mutually reinforcing in terms of the relationship of these variables with the GDP growth rate.

The size of the adjusted R^2 , reported in Table 2, shows that 59 per cent of the variation in the growth rate of the GDP of Pakistan is explained by the right hand side variables included in the model, showing a strong relationship of the dependent variable with the independent variables. Finally, the estimated model was checked for all possible misspecifications. No evidence of multi-collinearity was found and theoretically right size of D.W. Statistics indicates the absence of autocorrelation. Therefore, the results reported in Table 2 are well specified.

Table 3 provides the estimated coefficients of the simultaneous equation model. It is observed that the coefficient of the foreign resource content, MI_{it} , is insignificant both in Equation (1) and Equation (2). The result suggests that no quantifiable relationship of the foreign resource content with the manufacturing output and employment exists. Theoretically, the right sign of the coefficient in both equations

TABLE 3

Relative Significance of Domestic and Imported Resource Content
Estimated Coefficients: Manufacturing Sector of Pakistan (1975-91)

Equation (1)			Equation (2)		
Dependent Variable= OV_{it}	Observations=420		Dependent Variable= EL_{it}	Observations=420	
Variables	Co-efficient	t-Statistic	Variable	Co-efficient	t-Statistic
Constant	-3.1295	-0.378	Constant	0.878	0.285
EL_{it}	0.5121	0.949	OV_{it}	0.114	0.664
DI_{it}	0.1147**	2.020	DI_{it}	0.069**	2.116
MI_{it}	0.0004	0.089	MI_{it}	0.001	0.387
PC_t	4.1063*	1.867	MX_{it}	0.224*	1.904
$R^2 = 0.168$ Adjusted $R^2 = 0.160$ D.W. = 2.331			$R^2 = 0.144$ Adjusted $R^2 = 0.136$ D.W. = 2.230		

further validates this result. On the other hand, the estimated coefficient of the domestic resource content, DI_{it} is significant at the 5 per cent level, indicating a positive relationship of the manufacturing output and employment with the local inputs. The estimated coefficients of the per capita income of the economy, PC_t and the industry specific manufacturing exports MX_{it} in Equation (1) and Equation (2), also turn out to be significant at the 10 per cent level. The size of the adjusted R^2 is small in both equations, but it is acceptable when the relationships between the left hand side and right hand side variables are estimated within a system. Finally, the results reported in Table 3 have been checked and adjusted for heteroscedasticity and autocorrelation.

VI. Major Findings and Implications for Industrial Policy

Studies reviewed above, identify many important factors having serious implications for the development of the manufacturing sector in Pakistan. However, what is missing is the analysis of the domestic industrial base in terms of the absorption of locally available inputs. We, too, have carried out only a technocratic analysis of this aspect. Although the results underscore the strategic significance of the domestic resource content in the growth of both manufacturing output and employment, an analysis of political and sociological aspects of industrialization will certainly provide more useful insight into the misguided industrial strategy of Pakistan which has made the country very dependent on imports.⁸ It may be argued with the benefit of hindsight, that the state in Pakistan has mostly reflected the feudal and military aristocracy, which has always reigned in a relationship of both rivalry and partnership with each other and also with the industrial oligarchy. Together they have more or less ignored or hindered the development of domestic resource based industrialization.

In order to tap into indigenous technological capabilities and their productive potential, a developing country like Pakistan must ensure long run consistency between trade and industrial policies by adopting sustainable strategies. Since the early 1980s, the pattern of ownership in Pakistan's LSMS is increasingly becoming skewed in favor of foreigners, due to the special incentives and the guarantee against nationalization. However, economic rationality ought not to become a casualty while courting foreign direct investment (FDI) in Pakistan, specifically in the absence of local content requirement which can no longer be imposed under the

⁸ Inability to pay for the import of consumer goods only results in welfare loss, which may be entirely compensated if import substitutes are available. But the inability to pay for the import of producer goods and industrial raw materials, hurts the entire economy through backward and forward linkages of the industry. The higher the dependence on foreign resource content, the greater is the vulnerability of the economy, especially, if the appropriate and technologically compatible import substitutes are not readily available.

World Trade Organization (WTO).⁹ The upshot is that navigating daunting challenges and building a modern competitive economy requires approaches that are not business as usual. Are the new policies and environment up to the task?

Public policy in Pakistan, specifically in terms of its implementation, scarcely appears to underscore the strategic significance of agro-allied industries which happen to be the major consumers of domestic resources. Moreover, the policy statements on the steel mill, petrochemical industries, machine tools, etc., lack a clear vision of the country's future industrial policies.¹⁰ In the contemporary global village world, the interconnectivity of industrial, investment, and trade (IIT) policies warrants an increasingly harmonized and coordinated public policy approach.

Unfortunately, none of the policy documents of the successive governments in Pakistan lay emphasis on local content and reliance on domestic resources as a major, if not central, objective of industrial policy. The results of this study positively support such a policy which is expected to ensure value-addition and sustainable growth. Unfortunately, the country does not even have a database of existing and potential domestic raw materials.

The authors recommend the following broad measures:

1. encouraging the accelerated development and use of local raw materials and intermediate inputs;
2. developing and utilizing local technology;
3. maximizing the growth in value-added manufacturing activity;
4. upgrading small-scale and informal-sector enterprises;
5. gradually and consistently reducing the dependence on imported raw materials and technologies;
6. establishing local raw materials research institutes, with the industry linkage, in major schools of higher learning.

Finally, the industrialization process in Pakistan entails a continuum of new institutions and a cobweb of incentives since 1950s. A clearly targeted and result-oriented design of institutions and incentives essentially requires full empirical knowledge of the interventions made in the past. The empirical findings deduced from an unbiased design are expected to help decide which of the existing incentives and institutions should be continued, rationalized or phased out, and which new ones should be introduced under strategic considerations.

⁹ Ruling passed in the Uruguay Round Forests of trade talks.

¹⁰ Medium Term Development Framework (MTDF) 2005-10, Planning Commission, Government of Pakistan, March 2005.

VII. Conclusions

Manufacturing is not only the cornerstone of a modern economy, it is also the muscle behind national security. Strengthening manufacturing should be a top priority of economic policy in Pakistan. To help its manufacturers compete and win in the 21st century, a comprehensive review of the country's manufacturing sector needs to be carried out. The challenges facing the manufacturing sector in Pakistan raise important questions for both industry and government. For industry, the question is how best to ensure the sector's sustainability and strength for achieving the competitive edge in an increasingly competitive global economy. Some of the imported inputs doubtlessly play a significant role in production. However, excessive dependence on imports not only discourages and displaces many of the domestic economic activities, it also makes the domestic production subservient to the volatility of the international market. Indeed, many of the issues that arise from foreign trade also relate to broader economic development issues. Finally, manufacturers in Pakistan need to cut costs and adopt lean manufacturing techniques,¹¹ which favor the use of domestic resources. Economic policy should help reconcile the increasingly greater use of domestic resource content and the global economic pressures under which industries operate.

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¹¹ Lean manufacturing is an overall methodology that seeks to minimize the resources required for production by eliminating waste (non-value added activities) that inflates costs, lead times and inventory requirements, and emphasizing the use of preventive maintenance, quality improvement programs, pull systems and flexible work forces and production facilities.

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