ASARC WORKING PAPER 2018/01

Structural Transformation in South Asia

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ABSTRACT

This paper models the evolution and determinants of the shares of agriculture, manufacturing and services to GDP for 4 South Asian countries (Bangladesh, India, Sri Lanka and Pakistan) for 55 years: 1960-2014. Determinants of these shares were classified into three broad categories "country fundamentals", "policy" and "decadal dummies. We find that with increase in GDP the share of services rises strongly whereas the share of manufacturing has a more tepid rise with GDP whereas the share of agriculture falls in most cases. Land per capita is positively associated with share of agriculture whereas arable land only weakly so. As capital and power rise the share of agriculture drops wherever it appears whereas FDI negatively influences the share of agriculture in one case. Share of manufacturing drops with rises in arable land, and rises with trade, capital and power. The share of services falls with land per capita and rises with power. Other influences are largely insignificant. The Kuznets model of structural transformation is supported to some extent.

Keywords: South Asia, Structural Transformation, Pooled OLS, Quantile regression, Panel

JEL Classification Code: C22, C23, O11

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Structural Transformation in South Asia

"Since the industrial revolution, no country has become a major economy without becoming an industrial power."
Lee Kuan Yew, delivering the Jawaharlal Memorial Lecture in New Delhi, 2005

"…Industry does not emerge out of cumbrous bureaucratic planning, but from close human contact between small farmers and industrialists that released the latter's latent entrepreneurial talent."
H. Myint

"The slow take-off of India's manufacturing sector compared with many of its Asian neighbours is the source of a considerable amount of consternation and mystery."

OECD (2010)

I. Introduction and review of the literature

There are two school of thoughts in the literature on the links between economic growth and structural composition of output and/or employment. On the one hand the neoclassical school of economic growth would argue that the structure of output hardly matters for economic growth. On the other hand several economists, most famously Simon Kuznets and others, have argued that economic growth has been involved with a change in the composition of gross domestic product (GDP) and/or employment. Indeed this change is essential for sustained economic growth and rising incomes.

There is widespread consensus now that these two schools of thought are not mutually contradictory. In this context Echeveria (1997) builds a dynamic general equilibrium model to show that growth affects sectoral composition of output and vice versa. Thus, there is a mutual cause and effect relation between economic growth and composition of aggregate output.

The empirical evidence on structural transformation of an economy during the process of economic development is quite convincing. Historical data on most of the developed countries of today show that they went from being primarily agricultural economies to primarily manufacturing and, then, primarily services. At early stages of development when a country is heavily specialized in agriculture, labour productivity is low and the economy is largely stagnant. With increasing labour productivity there is economic growth and higher wages. However, the prospects for rapid productivity growth in agriculture are limited so that labour migrates to the manufacturing sector where there is greater scope for higher productivity and economic growth. This enhanced productivity and wages, in due course of time, lead to a shift of labour to services where there is greater scope for productivity growth. Thus, rising GDP per capita is associated with a decreasing share of agriculture, and increasing share of value added, first in manufacturing, and then services. Similar trend applies to sectoral shares of employment to total employment for these three sectors. Empirical evidence in support of this transition has been well explored in a number of contributions starting with the pioneering work of Simon Kuznets.[1] Other notable contributors to this literature include Hollis Chenery (1960), Arthur Lewis, Syrquin and Baumol.

In more recent times Timmer et al. (2012) take the work of Echeveria (1997) as a point of departure and underscore the fact that structural transformation is both the cause and effect of economic growth. They define structural transformation as a process by which (a) the shares of agriculture in GDP and employment fall over time, (b) there is increased migration as people move from rural to urban areas, (c) an agriculture and rural sector based economy is replaced by an industrial and urban sector based economy, and (d) a demographic transformation whereby high birth and death rates are replaced by low birth and death rates. Any existing dualism between the agricultural and the non-agricultural sectors gradually disappears over time.

This view of structural transformation argues that economic growth is a process that changes the composition of output as well as the pattern and distribution of employment across different sectors of the economy. Traditional agriculture is thought of as the base for less developed countries (LDCs). In such societies land and labour productivity are low and not much surplus is saved for investment. With the improvement of labour productivity, however, some labour is freed up for employment in the manufacturing sector which has higher labour productivity and, hence, higher wages. Higher incomes lead to increased savings and, hence, investment. This then further spurs up economic growth and the accompanying rise in labour productivity facilitates movement of labour from manufacturing to services. A key characteristic of this narrative is that economic growth is viewed as a long-term phenomenon which engineers structural change in the economy and is, in turn, affected by these changes. This is to be differentiated from annual or even quarterly growth figures which are widely reported in media and other outlets. Figure 1 provides a visual representation of the structural transformation visualized by the above arguments.

Figure 1 about here.

The x-axis in Figure 1 measures time and GDP per capita in the long run. The y-axis indicates sectoral shares in output/employment. Over time as GDP per capita rises the share of agriculture declines and those of services and manufactures rise. After reaching a threshold level of GDP per capita, the share of manufactures starts to plateau out (indicating industrial stagnation) and could even decline (indicating de-industrialization). The share of the services sector, however, continues to rise.

[1] For a review of this literature and the evidence see Kuznets (1973) and Kuznets (1966).

Many developed countries have followed this pattern of structural change. Even the Newly Industrialized Countries of Asia (including China) have experienced structural changes along these lines. All these countries raised their per capita incomes manyfold during short periods of time and are now in or close to being post-industrial societies.

However, this pattern of sectoral transformation has not been followed in a number of developing countries. Particularly in South Asia, the relative decline of the share of agriculture in GDP has been accompanied by a huge rise in the share of the services sector whereas the manufacturing sector has more or less stagnated. It would be desirable to alter the sectoral share pattern towards greater share of manufacturing, given unrealised higher productivity in manufacturing and the prospects of higher employment growth in the manufacturing sector compared to both agriculture and services, not to mention the fact that the current state of the South Asian economies represents arrested or incomplete industrialization.

The role of what may be called fundamentals of the economy (such as GDP, population, land etc.) and policy measures (such as trade openness) in facilitating this structural transformation can be best understood in a formal model of the determinants of the shares of the value added of various sectors in total value added. Taking a cue from Dabla-Norris et al. (2013) the present paper examines the determinants of the sectoral share of value added in four countries of South Asia (Bangladesh, India, Sri Lanka and Pakistan). The sectors considered are agriculture, manufacturing and services. The determinants of structural transformation are analysed based on sectoral value added to total GDP only. We introduce a number of additional policy variables on the right hand side of the regression equations in order to better understand possible policy levers that affect transitions in sectoral shares in the continent as well as country dummies.

The plan of this paper is as follows. Section II discusses recent history of the manufacturing sector in South Asia[2]data. Section III presents the methodology and results and section IV concludes.

II. A brief history of Manufacturing in South Asia/Undivided India

By all accounts India was a major manufacturing country prior to the arrival of the East India Company (Jha, 2018, vol. I, chapter 5). However, the country experienced an extended phase of deindustrialization after the onset of British rule.

Table I presents select data on India's share in world manufacturing output from just before the onset of EIC rule in India to just before the beginning of the Second World War. In 1750 India had almost a quarter share of world manufacturing despite the breakdown of central authority. China's share was close to a third. The

[2] South Asia is considered synonymously with undivided India for the period prior to 1947.

developed core of Western countries had 27 per cent of world manufacturing whereas the rest of the periphery had 15.7 per cent.

Table 1 about here.

With the onset of colonialism India's share of world manufacturing collapsed steadily to reach 1.4 per cent in1913 just before the First World War. The needs of war production raised its share to 2.4 per cent in 1938. Shares of other countries/groups also changed substantially over this period. China's share started to fall precipitously from 1800 to reach 3.1 per cent in 1938. The rest of the periphery consisting largely of countries that were colonised by one European power or another saw their shares drop sharply too whereas the share of the developed core rose steadily from 27 per cent in 1750 to 92.8 per cent in 1938. This was wholesale decimation of non-Western manufacturing.

The data are graphed in Figure 2 to assist in visualization of the data in Table 1. The transformation in the global manufacturing landscape from the mid 18th century to the beginning of the Second World War was truly spectacular.

Figure 2 about here.

Starting in 1750 there was a major break in the time series presented in Table 1 and graphed in Figure 2. The shares of India, China, and the Rest of the Periphery fell sharply whereas that of the developed core of nations rose even more sharply since all the increase in their share was coming at the expense of the shares of the other three groups. Mazumdar (2012) notes that by 1757 India was not only a dominant manufacturing nation but also had a flourishing and sophisticated system of markets and credits along with a thriving commercial class and service providers and rich and discerning patrons of the products of Indian industry. In other words had the Industrial Revolution come to India in 1757 or thereabouts the country would rapidly have grown into a major industrial power. However, under British rule, India was destined not for industrialization, but deindustrialization (Jha, 2018, vol. I, chapter 5).

For more recent times Appendix Table 1 provides descriptive statistics for the variables used in the analysis. The data are from World Development Indicators of the World Bank.

Notation for the variables used in the analysis is as follows.

The variables used in the analysis are: cid =country code (1 for Bangladesh, 2 for India, 3 for Sri Lanka and 4 for Pakistan); Time (year); $agri$ = share of agriculture in total value added; $manuf$=share of manufacturing in total value added; $service$=share of services in total value added; $llandpc$ = log of land area per capita in square kilometers; $arable$ = arable land as percentage of total land; age = age dependency ratio, overall; $lgdp$= log of GDP per capita (GDP is measured in constant 2005 USD); $lpower$ = log of electricity consumption per capita in Kwh; fdi=FDI inflows as percentage of GDP; $trade$ = trade as percentage of GDP; $capital$ = gross capital formation as percentage of GDP; and decadal dummies.

These variables are grouped into three different categories: (a) Fundamentals ($llandpc, arable, age,$ $and\ lgdp$); (b) Policy variables ($lpower, trade,\ fdi\ and\ capital$); and (c) Decadal dummies (D70, D80, D90, D00, D10). We use data from 1974 to 2014 which yields 41 data points giving a potential total of $164\ (41 * 4)$ observations for each variable. However, for Bangladesh the series begin in 1971 giving us 44 data points (176 observations for each variable) for that country. Hence, we have an unbalanced panel.

Panel variation in the variables is described in Table Appendix Table 1. “Overall”, “between” and “within” variations for each variable are depicted in Appendix Table 1. In this Table *N* refers to the total number of observations across countries and across time, *n* refers to the number of countries for which observations are available and T refers to time period for which the data are available. Clearly, N = n*T. For those variables for which data is not available for all time periods and/or all counties N=n*T-bar where T-bar again refers to the time period for which data are available. Table 1 summarizes the data gaps in the variables. Thus, for the variable “$agri$” a total of 209 data points are available for the four countries.

Appendix Table 2 depicts basic statistics for each of the four countries: Bangladesh, India, Sri Lanka and Pakistan.

Figure 3 provides scatter plots of sectoral value added (in percent in y-axis) against log of GDP per capita (x-axis) for South Asia and each of the four countries for all years.

Figure 3 here.

For South Asia and each of the countries the share of agriculture value added to total GDP falls steadily with the growth of GDP per capita. The share of manufacturing rises and then reaches a plateau of about 20 per cent in the case of South Asia. A similar pattern is observed for India and Bangladesh but not for Pakistan and Sri Lanka. The share of services rises with per capita GDP growth in South Asia as a whole and in each constituent country.

Thus, evidence for a Kuznets-type structural transformation, even in the raw data, in South Asia is weak. This pattern is being followed for the agricultural and services sectors but not for manufacturing. The latter is particularly true for Pakistan and Sri Lanka. The South Asian regional transformation patterns for agriculture and services sectors are same as those in developing Asia and advanced economies groups (see Dabla-Norris et al. 2013 for more) during the same period. However, manufacturing share for advanced economies appear with a gradual declining trend while that of developing Asia is in rising trend, similar to South Asia. An important issue to address here is whether the patterns observed in Figure 3 persist when control variables in the form of country fundamentals, policy variables and country dummies are introduced. We now investigate this.

III. Methodology and results

The issue of structural transformation is analysed based on the transformations in three sectors such as agriculture, manufacturing and service.

The data set consists of 4 countries (N) data for 41 years (T). Since the time dimension (T) of the data is much larger than the number of countries (N<T), dynamic panel data models may not be efficient. Given the pattern of the data, we apply feasible Generalised Least Square (feasible GLS) (see Greene, 2012 for detail GLS technique) technique for panel data. This allows to estimate the model in presence of AR(1) autocorrelation within panels and heteroscedasticity across panels. An important aspect of GLS estimation, which is also the common point of criticism of the method, is the assumption applied to the model. Tests for heteroscedasticity and serial correlation are done and the results are reported in Appendix Table 3, which serve as the basis for model assumptions.

Panel data heteroscedasticity test (LR test) and autocorrelation test have been done. For all three sectors we fail to reject the Null of homoscedasticity and first order autocorrelation. Based on the data[3] and our perception of the region, the GLS model structure assumed has heteroskedastic error structure with no cross-sectional correlation;[4] and there are AR(1) autocorrelation and that the coefficient of the AR(1) process is specific to each panel. As indicated in Appendix Table 3 we detect the presence of heteroskeadasticity and first order serial correlation in the data.[5]

The results are presented in Table 3 for agriculture; Table 4 for manufacturing and Table 5 for services. Five different versions of the model are estimated. We begin with the most parsimonious model (with only log

[3] Tests of heteroscedasticity and autocorrelation of the data are reported in the Appendix.
[4] Jha and Afrin (2017) in their analysis of structural transformation in Africa find that panel fixed effects regression is adequate.
[5] Since point estimates are sensitive to the model structure applied, completely wrong assumptions may lead us to incorrect inferences. Therefore, we will apply another possible model structure to check the validity of our findings in the baseline models. This will be presented in a revised version of the paper.

GDP) and then keep adding further variables. Model 2 introduces dummies for the four decades covered in the sample; Model 3 adds land per capita, Arable land, Age dep, trade, capital, power, fdi, and retains decade dummies; Model 4 augments model 1 to include decade dummies and interaction of decade dummies with GDP; and Model 5 includes all variables. Inclusion of the square of the GDP gave meaningless results so this variable was dropped from the estimation.

Tables 3, 4 and 5 here.

The coefficient of log GDP in the regression of share of agriculture in value added is negative and significant for all models except model 3 (where it is negative but insignificant). The coefficient of Land per capita is positive and significant in models 3 and 5 whereas the coefficient of arable land is significant only in Model 3; Age dependency and trade are insignificant throughout. The coefficients of Capital and Power are negative and significant wherever they appear (model 3 and 5); FDI has a negative and significant coefficient in Model 3 but is insignificant in model 5.

Table 4 shows results for the share of manufacturing sector. Log GDP has positive and significant coefficients in Models 1,2 and 4, whereas negative and significant coefficient in Model 3 and positive and insignificant coefficient in Model 5. Arable land has negative and significant coefficients in models 2, 3 and 5 whereas age dependency is significant only in Model 5. Coefficients of trade and power are positive and significant in models 3 and 5 whereas capital is significant (and positive) only in Model 3. The coefficient of FDI is negative and insignificant in both models 3 and 5.

Table 5 presents results for the services sector. In this case, coefficients of log GDP are positive and strongly significant in all 5 models. The coefficient of land per capita are negative and significant whereas the coefficients of arable land are negative and insignificant. Arable land, age dependency, trade, FDI and capital have insignificant coefficients in both models 3 and 5. Power has positive and significant coefficients in both models 3 and 5.

Thus, with increase in GDP the share of services rises strongly whereas the share of manufacturing has a more tepid rise with GDP whereas the share of agriculture falls in most cases. Land per capita is positively associated with share of agriculture whereas arable land only weakly so. As capital and power rise the share of agriculture drops wherever it appears whereas FDI negatively influences the share of agriculture in one case. Share of manufacturing drops with rises in arable land, and rises with trade, capital and power. The share of services falls with land per capita and rises with power. Other influences are largely insignificant.

IV. Concluding remarks

This paper models the evolution and determinants of the shares of agricultural, manufacturing and services sectors' value added for 4 South Asian countries for 41 years: 1974-2014.

Policy conclusions are derived from the viewpoint of increasing the shares of the services and, particularly, the manufacturing sector in value added. We find that enhanced availability of electrical power and higher capital investment are central to the enhancement of the share of the manufacturing sector in value added. The relationships of the shares with GDP per capita are fragile and, sometimes, counter-intuitive.

It seems that South Asia has undergone a period of arrested industrial development. There is urgent need for policy intervention if this condition is to be redressed.

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Figure 1: Sectoral Share of Output and GDP growth

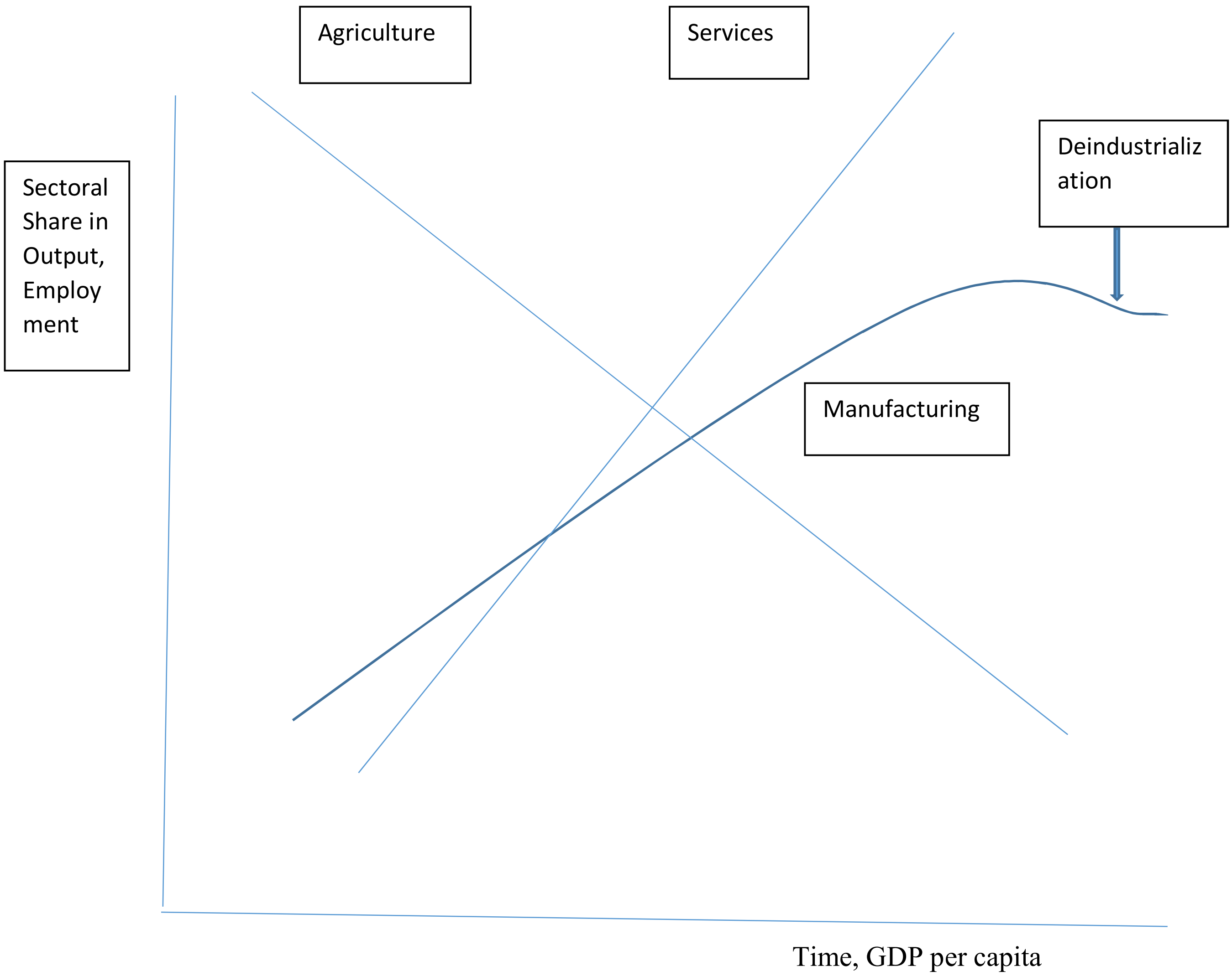
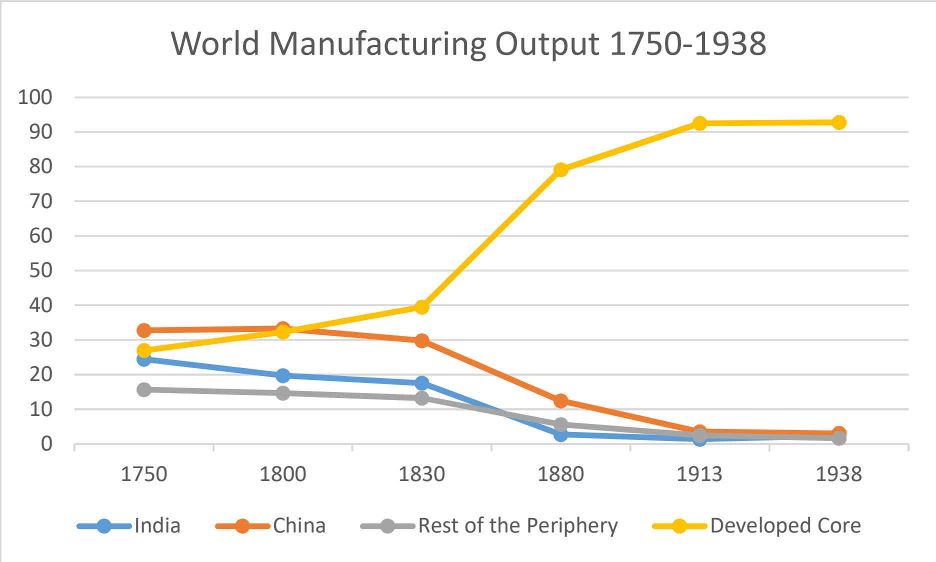
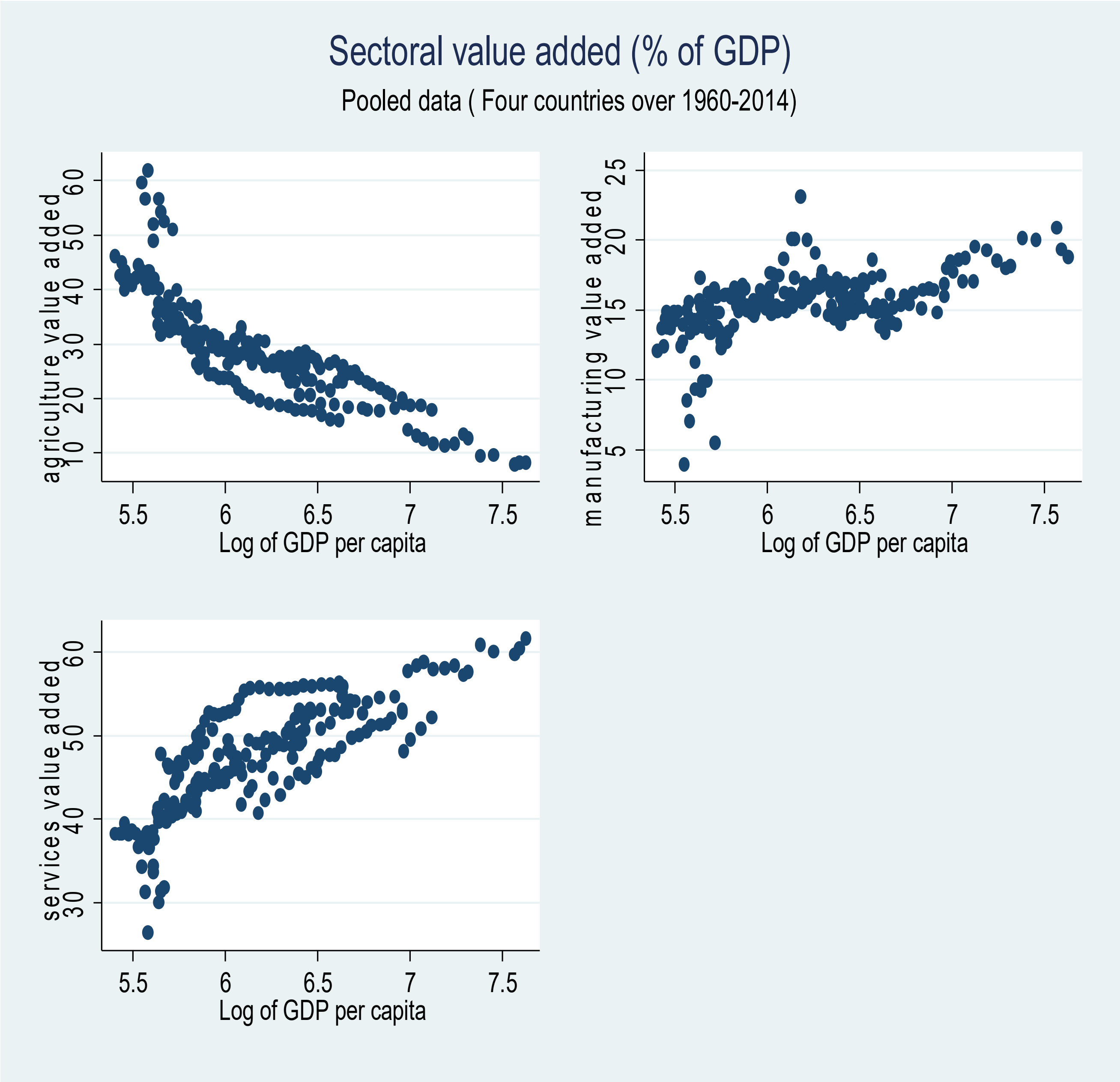


Figure 2: World Manufacturing Output 1750-1938 (in per cent)

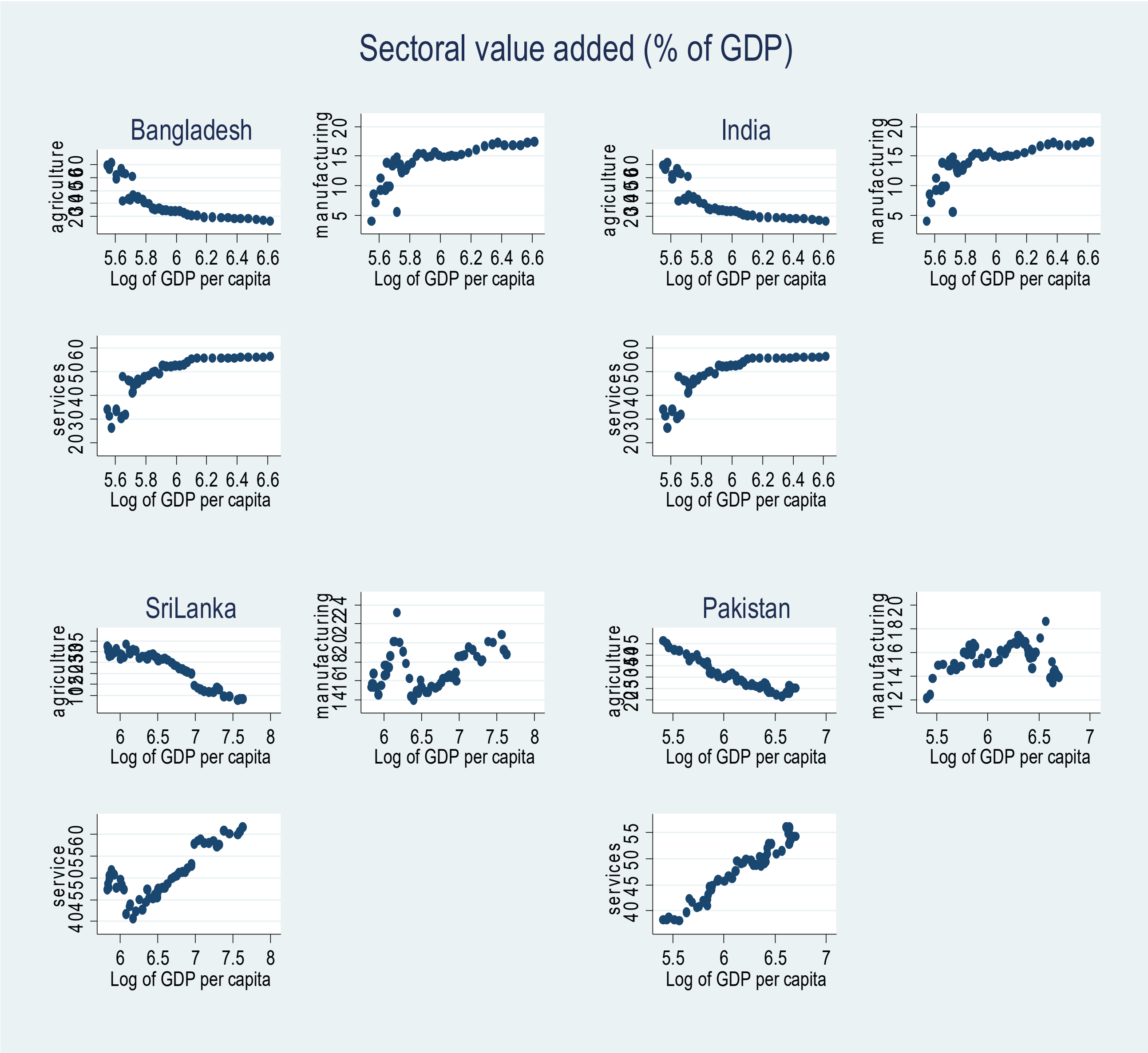


Source: Same as in Table 1

Figure 3: Links between sectoral shares of output and GDP per capita: South Asia and individual countries



Note: From left to right: Agriculture, Manufacturing and Services sector share to GDP.



Sectoral value added (% of GDP)
Bangladesh
India
SriLanka
Pakistan
agriculture
manufacturing
services
service
5 10 15 20
20 30 40 50 60
40 45 50 55
5.6 5.8 6 6.2 6.4 6.6
6 6.5 7 7.5 8
5.5 6 6.5 7
Log of GDP per capita

Table 1: World Manufacturing Output 1750-1938 (in per cent)

Year	India	China	Rest of the Periphery	Developed Core
1750	24.5	32.8	15.7	27.0
1800	19.7	33.3	14.7	32.3
1830	17.6	29.8	13.3	39.5
1880	2.8	12.5	5.6	79.1
1913	1.4	3.6	2.5	92.5
1938	2.4	3.1	1.7	92.8

Source: Clingingsmith and Williamson (2005) quoting Simmons (1985), Table 1, p. 600.

N.B. India refers to the current Indian sub-continent.

Table 3: Xtgls regression: determinants of share of agriculture in South Asia.

xtgls, panel(hetero) corr(psar1)					
Agriculture share in total value added	Model 1	Model 2	Model 3	Model 4	Model 5
gdp	-13.235 (0.00)	-11.539 (0.00)	-2.053 (0.457)	-13.768 (0.00)	-7.904 (0.009)
Land pc			5.195 (0.009)		4.046 (0.054)
Arable land			0.201 (0.009)		0.123 (0.136)
Age dep			-.0835 (0.386)		0.0079 (0.937)
trade			.014 (0.751)		.036 (0.369)
capital			-.201 (0.01)		-0.236 (0.005)
power			-4.782 (0.001)		-4.495 (0.004)
fdi			-.212 (0.533)		-0.105 (0.756)
D70		3.676 (0.021)	2.779 (0.141)	47.350 (0.043)	45.21 (0.145)
D80		1.96 (0.157)	1.724 (0.278)	-19.668 (0.308)	-50.00 (0.047)
D90		1.077 (0.346)	1.573 (0.213)	-22.502 (0.204)	-45.42 (0.033)
D00		-0.495 (0.829)	-.072 (0.935)	-15.457 (0.282)	-26.875 (0.114)
D10		Omitted			
gdp*D70				-7.493 (0.044)	-7.82 (0.112)
gdp*D80				3.395 (0.246)	7.857 (0.041)
gdp*D90				3.669 (0.161)	7.02 (0.027)
gdp*D00				2.274 (0.272)	3.931 (0.111)
constant	110.607 (00)	97.70 (0.00)	94.59 (00)	112.83 (0.00)	121.89 (0.00)
F test that u_i=0 (p-value)	129.26 (0.00)	270.56 (0.00)	234.59 (00)	341.98 (0.00)	.

Table 4: Xtgls regression: determinants of share of agriculture in South Asia.

xtgls, panel(hetero) corr(psar1)					
Manufacturing share in total value added	Model 1	Model 2	Model 3	Model 4	Model 5
gdp	1.688 (0.012)	1.787 (0.032)	-4.576 (0.00)	4.219 (0.00)	0.518 (0.702)
Land pc			-.941 (0.20)		-2.256 (0.002)
Arable land			-.077 (0.037)		-.105 (0.001)
Age dep			.0236 (0.497)		.0702 (0.042)
trade			.0568 (0.015)		.039 (0.055)
capital			.0729 (0.075)		.0468 (0.247)
power			1.963 (0.001)		2.911 (0.00)
fdi			-.153 (0.405)		-.318 (0.107)
D70		.509 (0.561)	-.179 (0.852)	-25.50 (0.022)	2.324 (0.871)
D80		.561 (0.457)	.0383 (0.962)	28.35 (0.001)	52.055 (0.00)
D90		.341 (0.584)	-.208 (0.743)	24.70 (0.002)	40.776 (0.00)
D00		.0678 (0.882)	-.361 (0.426)	9.384 (0.193)	17.997 (0.049)
D10					
gdp*D70				4.973 (0.005)	.468 (0.838)
gdp*D80				-4.293 (0.001)	-8.094 (0.00)
gdp*D90				-3.711 (0.002)	-6.26 (0.00)
gdp*D00				-1.33 (0.205)	-2.656 (0.05)
constant	5.065 (0.231)	4.159 (0.455)	27.11 (0.002)	-12.204 (0.053)	-20.40 (0.091)
Wald Chi2 (5) (p-value)	6.33 (0.011)	5.77 (0.329)	68.34 (0.00)	79.97 (0.00)	213.61 (0.00)

Table 5: Xtgls regression: determinants of share of services in South Asia.

xtgls, panel(hetero) corr(psar1)					
Service share in total value added	Model 1	Model 2	Model 3	Model 4	Model 5
gdp	10.225 (0.00)	7.263 (0.00)	5.968 (0.012)	7.341 (0.00)	7.746 (0.005)
Land pc			-4.180 (0.022)		-3.906 (0.048)
Arable land			-0.109 (0.104)		-.0832 (0.277)
Age dep			0.105 (0.241)		.0899 (0.338)
trade			-0.0535 (0.158)		-.0537 (0.157)
capital			-.00254 (0.973)		.0648 (0.411)
power			2.677 (0.047)		2.721 (0.061)
fdi			0.373 (0.276)		.352 (0.281)
D70		-5.848 (0.00)	-3.570 (0.062)	-57.805 (0.008)	-41.10 (0.149)
D80		-4.3112 (0.00)	-2.48 (0.123)	9.324 (0.597)	28.52 (0.213)
D90		-2.940 (0.003)	-1.840 (0.139)	9.531 (0.560)	17.72 (0.366)
D00		-0.334 (0.666)	0.199 (0.821)	13.391 (0.33)	16.343 (0.298)
D10					
gdp*D70				8.782 (0.012)	6.627 (0.142)
gdp*D80				-2.108 (0.436)	-4.765 (0.172)
gdp*D90				-1.867 (0.443)	-2.899 (0.319)
gdp*D00				-2.047 (0.305)	-2.391 (0.294)
constant	5.065 (0.231)	4.988 (0.485)	-26.56 (0.229)	4.733 (0.702)	-38.644 (0.091)
Wald Chi2 (5) (p-value)	76.52 (0.000)	243.95 (0.00)	212.90 (0.00)	211.13 (0.00)	248.90 (0.157)

Appendix Table 1: Summary Statistics of Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
agri	164	26.16	8.55	7.99	61.95
manuf	164	15.77	2.11	7.04	23.13
service	164	48.95	6.16	26.43	61.66
llandpc	164	-5.78	0.67	-7.11	-4.43
arable	160	43.87	19.21	13.30	73.39
age	164	70.89	13.39	48.02	93.29
trade	160	38.47	20.68	10.66	88.64
capital	160	21.83	5.89	6.15	38.16
lpower	156	5.16	0.89	2.83	6.61
fdi	163	0.71	0.74	-0.05	3.67

Appendix Table 2: Basic Statistics for selected countries

Bangladesh

Variable		Mean	Std. Dev.	Min	Max	Observations	
cid	overall	1	0	1	1	N =	41
	between		.	1	1	n =	1
	within		0	1	1	T =	41
Time	overall	1994	11.97915	1974	2014	N =	41
	between		.	1994	1994	n =	1
	within		11.97915	1974	2014	T =	41
agri	overall	29.72404	12.06386	16.109	61.95414	N =	41
	between		.	29.72404	29.72404	n =	1
	within		12.06386	16.109	61.95414	T =	41
manuf	overall	14.14102	2.442606	7.042276	17.4323	N =	41
	between		.	14.14102	14.14102	n =	1
	within		2.442606	7.042276	17.4323	T =	41
service	overall	48.18894	8.242102	26.43481	56.28189	N =	41
	between		.	48.18894	48.18894	n =	1
	within		8.242102	26.43481	56.28189	T =	41
llandpc	overall	-6.755478	0.2568321	-7.108305	-6.285092	N =	41
	between		.	-6.755478	-6.755478	n =	1
	within		0.2568321	-7.108305	-6.285092	T =	41
arable	overall	66.20919	4.630021	58.92295	73.38865	N =	40
	between		.	66.20919	66.20919	n =	1

	within		4.630021	58.92295	73.38865	T = 40
age	overall	76.501	13.33085	53.6859	93.28597	N = 41
	between		.	76.501	76.501	n = 1
	within		13.33085	53.6859	93.28597	T = 41
trade	overall	26.9014	9.93047	10.99563	48.11092	N = 41
	between		.	26.9014	26.9014	n = 1
	within		9.93047	10.99563	48.11092	T = 41
capital	overall	19.61032	6.055794	6.147906	28.57788	N = 41
	between		.	19.61032	19.61032	n = 1
	within		6.055794	6.147906	28.57788	T = 41
lpower	overall	4.140736	0.8910484	2.825396	5.629761	N = 39
	between		.	4.140736	4.140736	n = 1
	within		0.8910484	2.825396	5.629761	T = 39
fdi	overall	0.345386	0.4699233	-0.05146	1.449748	N = 41
	between		.	0.345386	0.345386	n = 1
	within		0.4699233	-0.05146	1.449748	T = 41

India

Variable		Mean	Std. Dev.	Min	Max	Observations
cid	overall	2	0	2	2	N = 41
	between		.	2	2	n = 1
	within		0	2	2	T = 41
Time	overall	1994	11.97915	1974	2014	N = 41
	between		.	1994	1994	n = 1
	within		11.97915	1974	2014	T = 41
agri	overall	26.83459	6.719399	17.73664	40.30984	N = 41
	between		.	26.83459	26.83459	n = 1
	within		6.719399	17.73664	40.30984	T = 41
manuf	overall	15.88877	0.8288249	14.59768	17.92443	N = 41
	between		.	15.88877	15.88877	n = 1
	within		0.8288249	14.59768	17.92443	T = 41
service	overall	46.78874	4.984411	38.21721	54.63926	N = 41
	between		.	46.78874	46.78874	n = 1
	within		4.984411	38.21721	54.63926	T = 41
llandpc	overall	-5.737353	0.2305015	-6.076856	-5.319629	N = 41
	between		.	-5.737353	-5.737353	n = 1
	within		0.2305015	-6.076856	-5.319629	T = 41

arable	overall	54.21891	0.7390882	52.65254	55.03113	N = 40
	between		.	54.21891	54.21891	n = 1
	within		0.7390882	52.65254	55.03113	T = 40
age	overall	67.55062	7.657368	53.14194	77.82484	N = 41
	between		.	67.55062	67.55062	n = 1
	within		7.657368	53.14194	77.82484	T = 41
trade	overall	25.65417	14.75006	10.66486	55.54501	N = 41
	between		.	25.65417	25.65417	n = 1
	within		14.75006	10.66486	55.54501	T = 41
capital	overall	25.9179	6.224439	18.04479	38.15775	N = 41
	between		.	25.9179	25.9179	n = 1
	within		6.224439	18.04479	38.15775	T = 41
lpower	overall	5.660508	0.5600235	4.64655	6.611693	N = 39
	between		.	5.660508	5.660508	n = 1
	within		0.5600235	4.64655	6.611693	T = 39
fdi	overall	0.6969481	0.8595184	-0.0291705	3.545983	N = 40
	between		.	0.6969481	0.6969481	n = 1
	within		0.8595184	-0.0291705	3.545983	T = 40

Sri Lanka

Variable		Mean	Std. Dev.	Min	Max	Observations
cid	overall	3	0	3	3	N = 41
	between		.	3	3	n = 1
	within		0	3	3	T = 41
Time	overall	1994	11.97915	1974	2014	N = 41
	between		.	1994	1994	n = 1
	within		11.97915	1974	2014	T = 41
agri	overall	21.31197	7.665616	7.99197	33.16453	N = 41
	between		.	21.31197	21.31197	n = 1
	within		7.665616	7.99197	33.16453	T = 41
manuf	overall	17.3804	2.182808	14.01324	23.1317	N = 41
	between		.	17.3804	17.3804	n = 1
	within		2.182808	14.01324	23.1317	T = 41
service	overall	50.89897	6.333973	40.63833	61.6563	N = 41
	between		.	50.89897	50.89897	n = 1
	within		6.333973	40.63833	61.6563	T = 41

llandpc	overall	-5.625199	0.1368231	-5.807499	-5.355794	N = 41
	between		.	-5.625199	-5.625199	n = 1
	within		0.1368231	-5.807499	-5.355794	T = 41
arable	overall	15.28145	2.024219	13.29931	20.73035	N = 40
	between		.	15.28145	15.28145	n = 1
	within		2.024219	13.29931	20.73035	T = 40
age	overall	57.40033	8.345697	48.0156	72.81457	N = 41
	between		.	57.40033	57.40033	n = 1
	within		8.345697	48.0156	72.81457	T = 41
trade	overall	70.72687	9.706255	46.36386	88.63646	N = 37
	between		.	70.72687	70.72687	n = 1
	within		9.706255	46.36386	88.63646	T = 37
capital	overall	24.25845	4.115389	14.44502	33.76824	N = 37
	between		.	24.25845	24.25845	n = 1
	within		4.115389	14.44502	33.76824	T = 37
lpower	overall	5.245673	0.6114841	4.221375	6.26684	N = 39
	between		.	5.245673	5.245673	n = 1
	within		0.6114841	4.221375	6.26684	T = 39
fdi	overall	0.9846254	0.6021541	-0.0296885	2.849577	N = 41
	between		.	0.9846254	0.9846254	n = 1
	within		0.6021541	-0.0296885	2.849577	T = 41

Pakistan

Variable		Mean	Std. Dev.	Min	Max	Observations
cid	overall	4	0	4	4	N = 41
	between		.	4	4	n = 1
	within		0	4	4	T = 41
Time	overall	1994	11.97915	1974	2014	N = 41
	between		.	1994	1994	n = 1
	within		11.97915	1974	2014	T = 41
agri	overall	26.77728	3.190834	21.4654	34.91255	N = 41
	between		.	26.77728	26.77728	n = 1
	within		3.190834	21.4654	34.91255	T = 41
manuf	overall	15.68626	1.150292	13.38731	18.56466	N = 41
	between		.	15.68626	15.68626	n = 1
	within		1.150292	13.38731	18.56466	T = 41
service	overall	49.9346	3.400082	43.15585	56.04457	N = 41

	between		.	49.9346	49.9346	n =	1
	within		3.400082	43.15585	56.04457	T =	41
llandpc	overall	-5.006818	0.3157122	-5.480818	-4.432665	N =	41
	between		.	-5.006818	-5.006818	n =	1
	within		0.3157122	-5.480818	-4.432665	T =	41
arable	overall	39.78148	1.008757	38.12526	42.98983	N =	40
	between		.	39.78148	39.78148	n =	1
	within		1.008757	38.12526	42.98983	T =	40
age	overall	82.10639	8.108615	65.7821	88.91287	N =	41
	between		.	82.10639	82.10639	n =	1
	within		8.108615	65.7821	88.91287	T =	41
trade	overall	33.73736	2.760978	27.71982	38.90949	N =	41
	between		.	33.73736	33.73736	n =	1
	within		2.760978	27.71982	38.90949	T =	41
capital	overall	17.77883	1.691566	13.37202	20.81826	N =	41
	between		.	17.77883	17.77883	n =	1
	within		1.691566	13.37202	20.81826	T =	41
lpower	overall	5.596498	0.5038564	4.67621	6.191469	N =	39
	between		.	5.596498	5.596498	n =	1
	within		0.5038564	4.67621	6.191469	T =	39
fdi	overall	0.822132	0.8329938	0.0455943	3.668323	N =	41
	between		.	0.822132	0.822132	n =	1
	within		0.8329938	0.0455943	3.668323	T =	41

Appendix Table 3: Tests for Heteroskedasticity and serial correlation.

LR test for heteroscedasticity	Wooldridge test for autocorrelation in panel data
LR chi2(3) = 143.82, Prob > chi2 = 0.0000	F(1, 3) = 19.521 Prob > F = 0.0215

p- values are for vce(robust) option.