IS THE RATE OF 'CONVERGENCE' ALWAYS CONSTANT? SOME EMPIRICAL EVIDENCE FROM SECTOR LEVEL DATA IN 56 COUNTRIES, 1975-99

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Abstract:
This paper deals with the issue of sector level convergence of gross domestic product for a combined set of developed and underdeveloped countries. A priori it is not assumed that the rate of convergence is constant. Instead, using a flexible functional form, it is found that the rate of convergence indeed varies with the level of income. The results indicate that for all the sectors considered, the rate of convergence falls as the level of GDP rises and it becomes zero after some threshold level of production being achieved. We find an increasingly dominant role of diminishing returns to capital. This also supports the hypothesis of "multiple regime equilibria". Evidence of convergence is much lower in the agricultural sector than in the industrial and services sectors.
Key Words: semiparametric econometrics, sector-wise convergence
JEL Classification: C0, E0, O1

1. Introduction.

The purpose of this paper is to re-examine the ongoing debate on income convergence from a sectoral perspective by using a flexible functional form. The present work aims at revisiting the widely discussed issue of growth-convergence from a different econometric and intuitive angle.

Numerical empirical papers have emerged to investigate the presence or the absence of convergence. Some of the leading papers include Baumol (1986), Dollar and Wolff (1988), DeLong (1988), Barro and Sala-i-Martin (1995), Islam (1995), Lee, Pesaran and Smith (1998), Cho (1994), Quah (1996), Caselli et al (1996) and Bernard and Jones (1996), only to name a few. Some recent papers have also analyzed various regional convergence issues. See,

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Matkowski et al (2004) for EU convergence, Sedgley et al (2004) for the US regional convergence and Chowdhury (2005) for ASEAN convergence. Most of these papers consider conditional "β-convergence".[1]

While various economic variables have been considered, almost all the studies have focused on aggregate data that combine heterogeneous sectors like agriculture and services. This can be particularly misleading, because the aggregate GDP data may facade the pattern of convergence at the sectoral level. Bernard and Jones (1996), and Temel et al (2005), among the very few, have looked into the issue of separate sector wise productivity convergence for the OECD countries and the Turkish provinces respectively. Bernard and Jones (1996) use a linear cross sectional framework while Temel *et al* (2005) uses a Markov-chains model.

Most of these studies use a linear model which assumes away any possibility of non constancy in the rate of convergence itself and hence overlooks the underlying dynamics of convergence. It may be too simplistic to assume that the convergence (if at all present) will always take place at a constant rate (as is implied by a linear parametric framework) for various levels of income. Thus the underlying dynamics of convergence remain unexplored in a linear framework. Besides, a-priori it is almost impossible to know the true underlying functional form relation or the type of nonlinearity associated with a typical growth regression and any misspecification of the functional form might lead to biased and misleading results.[2] Nonparametric regression approach, which uses a flexible (general) functional form and thus avoids any type of functional form misspecification bias, is more appropriate for this. The estimation, in this case, is done in a specification free, data driven way. The literature on convergence using a flexible (general nonlinear or nonparametric) functional form is somewhat limited although the existence of multiple regime equilibria (nonlinearity in convergence) has been well recognized almost a decade ago. In his cross sectional

[1] We also consider conditional β-convergence in this paper.

[2] Nonlinear models can also suffer from this problem if the form of the nonlinearity is misspecified.

study of convergence, Cho (1994) has used a nonparametric framework to investigate the rate of convergence. However, a purely nonparametric approach suffers from "dimensionality" problem. It requires a large sample size, without which the accuracy is not possible. Also the size of the sample required increases with an increase in the number of regressors involved in the nonparametric regression. In this regard, semiparametric approach (partially linear model) has been very useful. Such framework considers generic functional form (nonparametric) for the main variable(s) of interest while allowing for a linear functional form for the other control variables in the model. See Robinson (1988), Li and Stengos (1996), and Pagan and Ulllah (1999), Yatchew (2006) for the details on the methodology. We consider a pooled semiparametric framework to investigate convergence dynamics of sector level GDP.

The purpose of the present paper is of two fold: (1) to look at the sector level GDP convergence rather than aggregate GDP convergence for a combined set of developed and underdeveloped countries by using a (nonparametric) flexible functional form which will be free from any misspecification bias problem, (2) to capture the varying pattern of convergence/no-convergence for different levels of sector level GDP. Interestingly, using a flexible functional form, it is indeed observed that the rate of convergence varies significantly as the level of GDP changes. The plan of the paper is as follows. Section 2 analyzes the data and the empirical methodology. The results are discussed in section 3. Section 4 concludes.

2. Data and Empirical Methodology.

Sector level (agriculture, manufacturing, services)[3] data on real per capita GDP for 56 developed and developing countries have been considered. The time periods considered are 1975-1999. Five year average has been taken, thus introducing 5 different time periods (1975-79, 1980-84, 1985-89, 1990-94, and 1995-99) in our sample. This way the present analysis is much less sensitive to the beginning year as well as the end year chosen. The country list is given in tables A, B1 and B2. We also provide 5 year averages of the main variables considered for the period 1 (1975-99) and period 5 (1995-

[3] The choice of the sample is based on the availability of data.

99). The direction of the overall change between the overall sample period is also indicated in the tables. Table A presents per capita Value Added by sector and tables B1 and B2 in the Annex present the changes in control variables.

Table A Per capita Value Added and change in Agriculture (Agr), Manufacturing (Manuf), and Services (Serv)

Country		Agr	Ch	Manuf	Ch	Serv	Ch
Algeria	1	122	+	699.60	-	436.48	+
	5	136		665.29		473.27	
Argentina	1	527.97	-	3194.7	-	3539.0	+
	5	515.12		2892.5		4067.3	
Botswana	1	212.53	-	613.56	+	518.55	+
	5	177.22		1068.4		1113.7	
Brazil	1	268.38	+	1317.9	+	1632.0	+
	5	304.71		1357.2		1827.0	
Burundi	1	90.55	-	28.32	-	36.30	+
	5	80.08		26.28		38.46	
Cameroon	1	232.14	+	113.44	+	271.17	-
	5	243.82		130.21		236.71	
Central Afr.R.	1	188.05	-	82.71	-	162.99	-
	5	176.78		72.60		130.87	
Chile	1	216.08	+	737.11	+	900.17	+
	5	276.29		1075.8		1582.0	
China	1	64.88	+	47.90	+	35.55	+
	5	92.98		181.82		113.12	
Colombia	1	294.57	-	488.82	+	558.12	+
	5	287.85		565.53		789.98	
Congo, DR	1	90.02	-	123.25	-	151.70	-
	5	83.31		77.55		96.79	
Congo, Rep.	1	91.29	-	222.72	+	344.75	+
	5	89.23		272.75		381.17	
Cote d'Ivoire	1	272.62	-	142.66	+	767.95	-
	5	244.59		157.26		596.78	

Denmark	1	725.48	+	5778.7	+	14924	+
	5	940.44		6735.1		18916	
Ecuador	1	156.79	+	538.04	+	733.94	+
	5	170.58		547.16		759.95	
Egypt, A.R.	1	151.58	+	164.92	+	235.08	+
	5	158.74		241.65		364.63	
El Salvador	1	308.88	-	626.78	-	932.45	+
	5	267.89		561.82		964.64	
Fiji	1	414.39	+	525.29	+	977.26	+
	5	437.95		565.44		1031.5	
Finland	1	939.60	+	5174.5	+	9202.0	+
	5	969.23		6646.3		12303	
Ghana	1	97.99	+	68.84	+	191.73	+
	5	104.01		69.38		200.96	
Greece	1	1061.45	-	1668.0	+	4846.0	+
	5	1047.80		1867.8		6109.2	
Guatemala	1	394.59	-	304.85	-	788.14	+
	5	377.01		302.35		815.36	
India	1	86.67	+	46.88	+	74.74	+
	5	95.13		72.91		120.22	
Italy	1	477.24	+	4344.0	+	8182.5	+
	5	523.09		5012.2		10423	
Jamaica	1	133.79	+	724.87	-	794.82	+
	5	136.18		682.45		832.93	
Japan	1	922.10	-	9448.3	+	14618	+
	5	857.76		12356		19666	
Kenya	1	101.90	-	43.12	+	115.62	+
	5	95.76		44.09		132.57	
Korea, Rep,	1	632.32	+	964.43	+	1631.0	+
	5	652.31		2704.1		3410.3	
Lesotho	1	101.93	-	36.35	+	113.29	+
	5	87.00		92.15		149.42	
Madagascar	1	85.93	-	50.77	-	179.53	-
	5	78.92		41.54		152.24	
Malawi	1	46.82	+	29.15	-	70.78	-

	5	48.94		27.85		68.40	
Malaysia	1	492.20	+	609.67	+	912.96	+
	5	510.74		1197.4		1418.3	
Mali	1	95.74	+	35.04	+	121.94	-
	5	103.52		41.41		105.75	
Mauritius	1	359.21	-	391.30	+	857.50	+
	5	330.11		721.72		1359.7	
Mexico	1	168.71	-	740.81	+	1893.8	+
	5	164.40		820.92		2030.4	
Morocco	1	246.61	+	366.88	+	463.44	+
	5	247.24		396.90		558.82	
Nicaragua	1	288.73	-	212.54	-	435.08	-
	5	227.22		160.68		325.68	
Nigeria	1	100.00	-	180.00	-	50.04	+
	5	91.00		152.21		51.91	
Pakistan	1	85.83	+	53.23	+	123.56	+
	5	102.88		78.80		171.81	
Paraguay	1	387.78	+	352.63	+	723.78	+
	5	420.67		402.56		797.23	
Peru	1	181.89	+	998.72	-	1621.7	-
	5	184.08		952.98		1516.9	
Philippines	1	260.40	-	380.86	-	409.78	+
	5	245.57		368.77		462.24	
Rwanda	1	134.63	-	54.35	-	62.00	+
	5	112.18		50.41		69.69	
Senegal	1	155.60	-	104.38	+	342.22	-
	5	132.14		113.52		339.79	
Singapore	1	111.21	-	3763.6	+	6062.5	+
	5	79.42		6508.9		11691	
Sri Lanka	1	115.38	+	81.98	+	164.98	+
	5	128.41		130.41		250.89	
Swaziland	1	321.01	-	205.94	+	332.46	+
	5	261.38		329.79		385.61	
Thailand	1	224.43	+	271.84	+	497.09	+
	5	268.84		647.93		899.66	

Trinidad and Tobago	1	147.27	-	2979.8	-	2062.0	+
	5	119.59		2539.9		2173.4	
Tunisia:	1	241.60	+	385.24	+	842.54	+
	5	261.37		492.10		1047.17	
Turkey	1	490.68	-	462.51	+	990.04	+
	5	459.20		626.08		1195.2	
US	1	694.39	-	7617.2	+	14450.1	+
	5	618.07		7855.3		17974	
Uruguay	1	417.72	+	1641.0	+	2515.3	+
	5	470.86		1651.8		3124.4	
Venezuela, RB	1	210.08	-	1534.0	-	2698.1	-
	5	197.39		1465.3		2288.5	
Zambia	1	116.99	-	274.86	-	216.13	-
	5	90.90		202.36		209.96	
Zimbabwe	1	107.50	-	247.60	-	247.13	+
	5	105.52		212.13		286.71	

Note: 1. Sectors: Agr (Agriculture), Manuf (Manufacturing), Serv (Services). 1 and 5 refer to periods 1 and 5 respectively. 2. Ch means Change: - (Decrease), + (Increase), = (the same or stagnation).

First a linear parametric framework is considered, as a benchmark. The model considered is

$Y_{it} = m + bX_{it} + g Z_{it} + u_{it}$

Where Y_{it} captures the average growth of real sectoral GDP per capita over the five year period chosen, Z_{it} captures the log of initial year GDP of the five year period chosen, X_{it} is the vector of all the control variables considered in the regression (averaged over 5 year time period) and u_{it} is the *i.i.d.* error term. The growth variable is defined as the difference between the logs of actual values of real sector-wise product.[4] The control variables include, investment

[4] We have sector wise, value added measured in terms of the 1995 constant US dollar. The per capita measures of such variables are provided in the appendix (Table A) for the beginning (period 1) and the end (period 5) periods. Our growth variable is measured in the following way. First, we take natural log of the per capita values and then consider their differences over the period (end year value minus the beginning year value). Thus the

(INV) as a percentage of GDP, Inflation rate (INFL), schooling (SCH) defined as a net percentage of secondary school enrollment, net inflow of foreign direct investment (FDI) as a percent of GDP, government consumption (GOVT, as a proxy for corruption at the government level) and TRADE (exports plus imports), both as percentages of GDP. Low and middle income group dummies (following The World Bank categorization of low and middle income groups) have also been introduced. The data source is World Development Indicator (WDI), 2001 and the more detailed definitions are publicly available in WDI. In order to subdue any possible endogeneity, we have considered one period lag for the other continuous control variables and this is in consonance with the existing literature. Similarly for the initial income, we consider one period lag, i.e., for the period 1995-1999, instead of using the year 1995, we use the year 1990, which is the initial year for the previous period (1990-94).[5]

For our semiparametric framework the model can be rewritten as

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growth variable is defined as the difference between the logs of actual values of real sector-wise product. We then divide it by the number of years considered in the period to get the average yearly growth. This definition is similar to the one used in Barro and Sala-i-Martin (1995), section 1.2.

[5] If we consider the country specific fixed effects, then we need to use 'difference' estimator as in Caselli et al (1996) and Ullah and Kumar (2000), in order to wipe out the heterogeneity terms. In that case the income group dummies will be dropped. We have performed such analysis and the results do not change much qualitatively. These two studies have also considered a two period lag for the initial income and a one period lag for the other continuous variables which we also do. When the income group dummies are dropped, results for the linear part of the semiparametric regression mostly remain the same as far as the signs and significance of the coefficients are concerned. Only exception is the schooling variable which now turns out to be significant. The nonlinear part of the semiparametric regression looks somewhat different. The shapes of the analogous graphs (partial effects) as in Figures 1-3 remain the same, although the significance levels of theses partial effects drop. The fit of the model deteriorates considerably in this case. So we plan to use a pooled framework with income group dummies only.

$Y_{it} = bX_{it} + m(Z_{it}) + u_{it}$

Where $m(.)$ captures the unspecified functional form for the main variable of interest, Z_{it} only. All other covariates (X_{it}) are allowed to have a linear form. It is assumed that the errors are conditionally homoscedastic.[6] Our use of five year average is in parity with the existing literature. This gives us more information (larger sample size) and the results are much less sensitive to the beginning year (initial year) chosen (which is always ad hoc). See Robinson (1988), Li and Stengos (1996), Baltagi and Li (2002) and Pagan and Ulllah (1999) for details. A rigorous kernel based test for functional form misspecification shows that the underlying relationships between sector level income growth and initial level of income are nonlinear for all the sectors. We have performed Li et al (2002) test where, the null hypothesis supports the linear regression model as in (1) and the alternative hypothesis favors the partially linear model as in (2). The Wild bootstrap[7] critical values of the computed test statistic (*J-statistic*) are 19.56, 14.26 and 11.32 for the three sectors (agriculture, manufacturing and services respectively) with the corresponding p-values of 0.10, 0.003 and 0.06. The test therefore, rejects the linearity for the initial income variable in all three cases. Figures 1 through 3 also show that the relationships are not linear. While the results for the parametric models are reported in Table-1, the semiparametric regression results are summarized in Table-2. However, more informative are the plots of the semiparametric conditional first derivatives, i.e., $\partial Y_{it}/\partial Z_{it}\ [=\partial m(Z_{it})/\partial Z_{it}]$ as presented in Figures 1-3. For example, in Figure 1 the estimated point wise conditional first derivatives (local linear slope coefficients) are plotted in the vertical axis. This measure the partial effects (the convergence coefficients) of initial level of GDP in agriculture on the growth rate of GDP in agriculture. In the horizontal axis the initial level of GDP in agriculture is measured. A 5 % confidence band is also shown.[8]

[6] Kernel smoothing technique (standard normal kernel) and optimal bandwidth have been used.

[7] 800 bootstrap replications have been used.

[8] In general, the derivatives are not considered significant in the ranges in which the horizontal zero line (implying that the partial effects are all zero) passes through the confidence band.

Figures 2 and 3 present plots to capture similar partial effects in manufacturing and services sectors respectively.

3. Results.

It follows from our results (both parametric and semiparametric) that trade variable is significant only for agriculture whereas inflation and low income dummy variables are significant for the other two sectors. This is an interesting phenomenon that merits some attention. It is not surprising that investment is always significant. FDI variable is statistically insignificant for all cases. All other covariates are occasionally significant and all the coefficients have their expected signs.

Table 1: Parametric Results

Variable	Agriculture	Manufacturing	*Services*
Initial GDP	-0.01 (-1.81)*	-0.02702 (-6.59)***	*-0.01* *(-4.09)****
INV	0.001 (3.19)***	0.005 (9.20)***	*0.003* *(6.69)****
INFL	-3.1E-06 (-0.67)	-2.9E-05 (-4.29)***	*-2.7E-05* *(-4.86)****
SCH	0.0001 (1.29)	0.0004 (1.98)**	*0.0003* *(1.77)**
FDI	0.0015 (1.28)	-0.0004 (-0.21)	*-0.0001* *(-0.09)*
TRADE	-0.0003 (-5.56)***	5.48E-05 (0.64)	*-2.4E-05* *(-0.33)*
GOVT	-0.001 (-1.22)	0.0002 (0.33)	*0.001* *(1.08)*
Low Income Dummy	-0.012 (-1.63)	-0.06 (-5.60)***	*-0.05* *(-6.03)****
Middle Income Dummy	-0.01 (-1.95)*	-0.01 (-2.02)**	*-0.001* *(-0.35)*
R^2	*0.94*	*0.96*	*0.98*

T-stats are in the parentheses. Total number of observations is 280.
* implies significant at 10%, ** implies significant at 5% and *** implies significant at 1% level.

It follows from the parametric result that the convergence terms (partial effect of initial GDP on its growth rate) are negative and significant for manufacturing and service sectors although it is not statistically significant (at 5%) for agricultural sector.

Average convergence coefficients, obtained from the semiparametric model (see, Table 2) also depict the similar pattern. As new technological innovations get transmitted to the relatively poorer countries from the leader countries, the relatively backward countries eventually catch up with the leader, leading to convergence.

Table 2: Semiparametric Results

Variable	Agriculture	Manufacturing	Services
Initial GDP	-0.012 (-1.24)	-0.03 (-3.22)***	-0.02 (-1.92)*
INV	0.001 (2.84)***	0.005 (9.69)***	0.003 (6.34)***
INFL	-3.8E-06 (-0.83)	-3E-05 (-4.65)***	-2.6E-05 (-4.67)***
SCH	0.0002 (1.09)	0.0001 (0.74)	0.0001 (0.64)
FDI	0.001 (0.79)	1.84E-05 (0.01)	-0.0003 (-0.21)
TRADE	-0.0003 (-4.88)***	7.16E-06 (0.09)	-7.1E-06 (-0.09)
GOVT	-0.0004 (-0.76)	-0.0004 (-0.65)	0.001 (0.87)
Low Income Dummy	-0.014 (-1.61)	-0.08 (-6.68)***	-0.07 (-6.54)***
Middle Income Dummy	-0.004 (-0.96)	-0.009 (-1.48)	-0.003 (-0.54)
R^2	0.97	0.98	0.99

T-stats are in the parentheses. Total number of observations is 280. The average of the point-wise nonparametric conditional derivatives are reported as the coefficients of initial GDP (highlighted). * implies significant at 10%, ** implies significant at 5% and *** implies significant at 1% level.

However, agriculture is less technology based and poorer countries are seldom able to adjust to the climatic shocks.[9] Convergence coefficients may be interpreted as in Barro and Sala-i-Martin (1995, section 1.2). A significantly negative (positive) coefficient implies convergence (divergence). Thus a coefficient, say -0.02 implies that the convergence rate is 2% per year and therefore, the "half-life is about 35 years"[10]. That means it will take 70 years to "close three-quarters of an initial gap from the steady-state position".

Although we provide average of the semiparametric point-wise convergence coefficients in Table-2, more informative are the graphs based on these point-wise coefficients. These graphs (Figures 1-3) depict a clear evidence of varying rates of convergence. It is evident for all three sectors that the rate of convergence[11] slows down eventually as GDP rises and after reaching a threshold it actually becomes zero.[12] This depicts an increasingly dominant role of such diminishing returns as income level goes up. Note that the "diminishing returns to capital" is a key to convergence. However, if it becomes too forceful, it can slow down the process by itself, after a level of income (hence capital). Richer the country becomes, more capital it accumulates and due to "diminishing returns to capital", slower the growth rate turns out to be. For an initially poorer countries (capital-sparse country), the convergence rate will therefore, be high (as we see in our graphs); but the rate will go down and then it will be close to zero for less poorer and relatively richer countries. So the "diminishing returns to capital" which helps the poor countries catch up towards the rich ones, can itself slow down the process once the countries achieve a threshold level of growth and are not so poor any more. And we find that after a point the convergence rate simply falls down to zero (only insignificant

[9] Famines in Ethiopia and frequent floods in Bangladesh are some of the cases in point.

[10] Half life is defined as $\log(2)/\delta$ or $0.69/\delta$, when δ is the convergence coefficient, i.e., 0.02 in our example.

[11] Significantly negative coefficients imply convergence.

[12] The threshold income levels are different for different sectors as expected. It is also clear from the plot that agriculture shows the least evidence of convergence.

coefficients are found beyond a threshold level of income). Although our estimated average convergence coefficients (for all three sectors) are similar to those found in the existing literature (for linear models using aggregate GDP data) but the dynamics of convergence exhibits an interesting feature that calls for more theoretical investigation on the varying rates of convergence phenomenon.

4. Conclusion.

The present paper provides sector wise analysis of the convergence dynamics for a combined set of developed and underdeveloped countries. Using a semiparametric flexible functional form, strong evidence in favor of different rates of convergence for different levels of GDP has been found. This clearly discards a linear model which assumes that the partial effect stays the same.

Also agricultural sector shows much less evidence of convergence as compared to the other two sectors. In terms of sectoral classifications, our service sector is similar to the ones in Bernard and Jones (1996) and Temel et al (2005). We do find an evidence of catch-up for this sector which is fully in consonance with these two papers. Other sectoral classifications are not very similar because both of these papers are considering six different sectors and thus have much narrower classifications.

Our classifications for agriculture and industry are much broader due to unavailability of data at a more disaggregated level for the developing countries. It is also observed that the convergence rate slows down as production level goes up and beyond a threshold level of GDP (which is different for different sectors) it becomes zero (or statistically insignificant). The convergence dynamics provide support for the hypothesis of multiple regime equilibria. We find an increasingly dominant role of diminishing returns to capital as income level goes up. This calls for a more rigorous theoretical and empirical investigation of convergence dynamics at various sector and sub-sector levels.

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Annex

Table B1: Control Variables and changes

Country Name		INV	Ch	INFL	Change	SCH	Ch
Algeria	1	33.17	-	15.42	+	11.2	+
	5	26.61		30.62		60.79	
Argentina	1	23.12	-	39.62	+	44.40	+
	5	19.49		444.6		71.09	
Botswana	1	37.99	-	8.47	=	7.5	+
	5	27.96		8.84		42.70	
Brazil	1	20.63	-	22.79	+	25.9	+
	5	19.44		1625		38.40	

Burundi	1	5.30	+	5.76	=	1.6	+
	5	14.22		5.92		5.59	
Cameroon	1	31.78	-	7.29	-	8.10	+
	5	16.02		3.39		28	
Central African Rep.	1	10.63	+	4.33	=	4.19	+
	5	11.31		4.46		11.7	
Chile	1	17.31	+	244.7	-	37.40	+
	5	22.73		15.49		73.5	
China	1	29.07	+	0.94	+	24.29	+
	5	31.54		10.84		48.70	
Colombia	1	16.65	+	16.24	+	22.9	+
	5	17.76		29.56		49.79	
Congo, Dem. Rep	1	14.39	-	10.33	+	9.39	+
	5	7.16		6962		22.70	
Congo, Rep	1	33.57	-	7.08	-	18.6	+
	5	27.87		6.33		52.90	
Cote d'Ivoire	1	20.61	-	8.89	-	9.10	+
	5	8.90		7.55		22	
Denmark	1	25.22	-	10.05	-	93	+
	5	18.26		2.48		109.2	
Ecuador	1	18.41	+	13.01	+	26.20	+
	5	19.24		43.02		55.29	
Egypt, Arab Rep	1	12.36	+	5.97	+	28.4	+
	5	20.20		13.91		76.19	
El Salvador	1	15.11	+	4.90	+	21.5	+
	5	16.48		13.46		26.4	
Fiji	1	19.20	-	14.11	-	28.5	+
	5	13.23		4.71		56.20	
Finland	1	29.13	-	11.28	-	101.9	+
	5	20.94		2.49		116.4	
Ghana	1	10.53	+	13.80	+	14.1	+
	5	17.86		24.81		36.40	
Greece	1	30.34	-	10.49	+	62.79	+
	5	20.52		15.73		93.30	
Guatemala	1	13.49	+	6.50	+	8.39	+
	5	14.22		21.71		19.5	
India	1	15.03	+	10.51	=	24.20	+
	5	22.18		10.62		44.40	
Italy	1	25.93	-	10.80	-	60.79	+

	5	19.88		5.55		82.80	
Jamaica	1	26.56	+	13.06	+	45.59	+
	5	30.40		41.48		65	
Japan	1	35.00	-	10.13	-	86.59	+
	5	30.36		1.49		97.09	
Kenya	1	20.74	-	6.71	+	9.10	+
	5	15.67		17.03		24.1	
Korea, Rep	1	23.97	+	18.91	-	41.59	+
	5	37.09		8.62		89.80	
Lesotho	1	11.35	+	6.22	+	6.90	+
	5	59.49		11.54		25.29	
Madagascar	1	8.55	+	9.64	+	10.3	+
	5	11.80		18.48		18	
Malawi	1	19.66	-	9.04	+	3.7	+
	5	18.11		18.79		7.69	
Malaysia	1	22.24	+	6.01	-	34.20	+
	5	37.02		3.54		56.29	
Mali	1	14.12	+	5.59	+	4.90	+
	5	23.34		7.87		7.0	
Mauritius:	1	16.19	+	19.34	-	30.70	+
	5	29.26		7.75		52.90	
Mexico:	1	19.21	-	10.39	+	22.5	+
	5	18.81		16.71		53.29	
Morocco:	1	14.32	+	8.21	-	12.6	+
	5	22.41		4.33		35.29	
Nicaragua:	1	17.94	+	9.63	+	17.20	+
	5	19.42		1944		40.5	
Nigeria:	1	19.80	+	20.96	+	5.19	+
	5	20.50		38.27		24.9	
Pakistan:	1	12.90	+	11.34	-	12.8	+
	5	18.05		10.22		22.70	
Paraguay:	1	15.39	+	12.22	+	15.9	+
	5	22.42		23.18		30.9	
Peru:	1	17.72	=	10.62	+	30.70	+
	5	17.73		1471		67.30	
Philippines:	1	18.17	+	15.64	-	45.79	+
	5	22.29		10.85		73.19	
Rwanda:	1	9.12	+	6.29	+	3	+

	5	13.83		13.37		8	
Senegal:	1	11.28	+	6.71	-	9.30	+
	5	14.22		5.70		16.20	
Singapore:	1	36.05	-	8.00	-	46.0	+
	5	34.33		3.24		68.09	
Sri Lanka:	1	14.60	+	10.54	+	47.0	+
	5	23.97		11.94		73.80	
Swaziland:	1	19.13	+	9.36	+	18.5	+
	5	24.13		10.52		43.90	
Thailand:	1	23.10	+	7.86	-	17.4	+
	5	40.13		4.91		30.1	
Trinidad & Tobago:	1	24.28	-	18.87	-	43.00	+
	5	15.57		8.98		80.40	
Tunisia:	1	20.28	+	9.58	-	22.70	+
	5	29.64		5.25		44.90	
Turkey:	1	13.68	+	17.83	+	26	+
	5	24.29		71.09		47.29	
US	1	18.74	-	5.94	-	83.69	+
	5	16.74		2.89		93.09	
Uruguay	1	11.23	+	65.02	+	58.79	+
	5	13.81		70.81		81.30	
Venezuela, RB:	1	22.9	-	15.14	+	35.00	=
	5	18.20		37.18		34.70	
Zambia	1	29.70	-	3.10	+	12.8	+
	5	11.63		114.7		24.1	
Zimbabwe	1	17.62	+	3.62	+	7.5	+
	5	21.22		23.17		49.5	

Note: 1. INV (investment), INFL (inflation), SCH (schooling). 1 and 5 refer to periods 1 and 5 respectively. 2. Ch means Change: + (increase), - (decrease), = (the same or stagnation).

Table B2: Control Variables and changes

Country Name		FDI	Ch	TRADE	Ch	GOV.	Ch
Algeria	1	0.32		54.75		14.52	
	5	0.02	-	48.98	-	16.51	+
Argentina	1	0.03		12.70		10.79	
	5	1.40	+	15.58	+	7.23	-
Botswana	1	0	-	81.59	+	15.09	+

	5	-0.98		92.69		26.32	
Brazil	1	1.22		16.96		10.66	
	5	0.37	-	17.86	+	17.95	+
Burundi	1	0		24.27		11.49	
	5	0.06	+	38.03	+	11.52	=
Cameroon	1	0.58		48.09		11.79	
	5	-0.19	-	37.14	-	12.32	+
Central African Rep.	1	0.72		67.13		19.48	
	5	-0.27	-	40.58	-	16.12	-
Chile	1	-1.02		28.79		14.31	
	5	2.79	+	60.50	+	9.82	-
China	1	0		5.71		7.77	
	5	3.48	+	37.85	+	12.82	+
Colombia	1	0.38		29.67	+	9.516	
	5	1.46	+	35.08		10.54	+
Congo, Dem. Rep	1	0		31.18		12.16	
	5	-0.01	=	40.07	+	13.27	+
Congo, Rep	1	10.37		89.11		17.37	
	5	0.13	-	104.56	+	18.69	+
Cote d'Ivoire	1	1.44		68.22		15.41	
	5	0.08	-	61.64	-	16.01	+
Denmark	1	0.14		57.50		22.26	
	5	1.44	+	66.23	+	25.95	+
Ecuador	1	4.78		45.40		10.85	
	5	2.08	-	56.52	+	8.11	-
Egypt, Arab Rep	1	0		37.80		25.27	
	5	1.39	+	57.34	+	10.67	-
El Salvador	1	0.61		58.81		10.58	
	5	0.20	-	50.94	-	9.25	-
Fiji	1	2.89		103.2		13.5	
	5	4.58	+	117.5	+	18.22	+
Finland	1	0.14		50.73		15.66	
	5	0.65	+	53.65	+	23.92	+
Ghana	1	1.16		38.78		12.31	
	5	1.46	+	47.80	+	11.81	-
Greece	1	1.16		29.32		9.26	
	5	1.11	-	44.73	+	15.04	+
Guatemala	1	1.32	-	39.79	+	7.09	-

	5	0.85		43.38		6.07	
India	1	0.05		8.63		9.15	
	5	0.14	+	20.01	+	11.38	+
Italy	1	0.45		35.81		16.16	
	5	0.33	-	40.05	+	19.92	+
Jamaica	1	6.51		74.70		14.40	
	5	3.24	-	121.4	+	12.46	-
Japan	1	0.01		21.58		8.19	
	5	0.04	+	18.00	-	9.24	+
Kenya	1	0.31		62.05		17.07	
	5	0.21	-	64.43	+	16.74	-
Korea, Rep	1	0.19		49.83		9.79	
	5	0.26	+	57.14	+	10.49	+
Lesotho	1	0		83.66		12.66	
	5	1.65	+	139.3	+	15.12	+
Madagascar	1	0.60		35.53		13.00	
	5	0.52	-	43.86	+	7.96	-
Malawi	1	2.79		63.15		14.54	
	5	0.15	-	63.53	=	17.28	+
Malaysia	1	2.86		77.40		16.12	
	5	7.10	+	158.9	+	13.08	-
Mali	1	0.13		36.10		10.12	
	5	0.03	-	52.99	+	12.94	+
Mauritius:	1	0.23		90.97		12.06	
	5	0.73	+	127.9	+	11.91	-
Mexico:	1	0.83		17.50		8.37	
	5	1.48	+	36.47	+	10.0	+
Morocco:	1	0.20		42.48		12.08	
	5	1.38	+	56.71	+	16.61	+
Nicaragua:	1	1.36		62.68		8.91	
	5	1.03	-	70.52	+	22.69	+
Nigeria:	1	2.14		27.57		9.03	
	5	4.40	+	80.67	+	15.48	+
Pakistan:	1	0.08		27.08		10.79	
	5	0.67	+	39.41	+	13.46	+
Paraguay:	1	0.91		30.09		7.50	
	5	1.49	+	75.92	+	6.55	-
Peru:	1	-0.07		31.62		12.44	
	5	1.89	+	28.39	-	8.08	-

Philippines:	1	0.01		43.93		9.67	
	5	1.52	+	66.25	+	10.12	+
Rwanda:	1	0.45		27.38		10.55	
	5	0.19	-	33.15	+	11.44	+
Senegal:	1	0.84		65.71		13.79	
	5	0.61	-	59.09	-	14.22	+
Singapore:	1	6.85		255.8		11.56	
	5	10.30	+	363.9	+	9.46	-
Sri Lanka:	1	0.01		52.35		11.87	
	5	1.13	+	73.04	+	9.61	-
Swaziland:	1	0.30		137.0		14.92	
	5	7.03	+	162.8	+	20.64	+
Thailand:	1	0.81		38.15		10.57	
	5	1.84	+	78.79	+	9.65	-
Trinidad & Tobago:	1	8.09		86.47		14.11	
	5	5.49	-	77.90	-	12.52	-
Tunisia:	1	1.37		53.08		15.09	
	5	2.32	+	89.40	+	16.34	+
Turkey:	1	0.25		13.71		10.38	
	5	0.47	+	33.57	+	12.17	+
US	1	0.14		12.98		18.12	
	5	0.60	+	20.99	+	16.54	-
Uruguay	1	0		26.46		14.47	
	5	0.33	+	39.82	+	11.94	-
Venezuela, RB:	1	-0.57		42.45		11.11	
	5	1.51	+	55.95	+	8.60	-
Zambia	1	-2.48		87.43		20.08	
	5	2.37	+	74.23	-	19.48	-
Zimbabwe	1	0		43.37		10.86	
	5	0.21	+	58.94	+	18.27	+

Note: 1. FDI (foreign direct investment), Trade (Trade), Gov. (Government Consumption). 1 and 5 refer to periods 1 and 5 respectively. 2. Ch means Change: – (Decrease), + (Increase), = (the same or stagnation).

Figures 1 to 3 in Appendix at the journal web site: http://www.usc.es/econo met/rses.htm

Figure 1: Agriculture

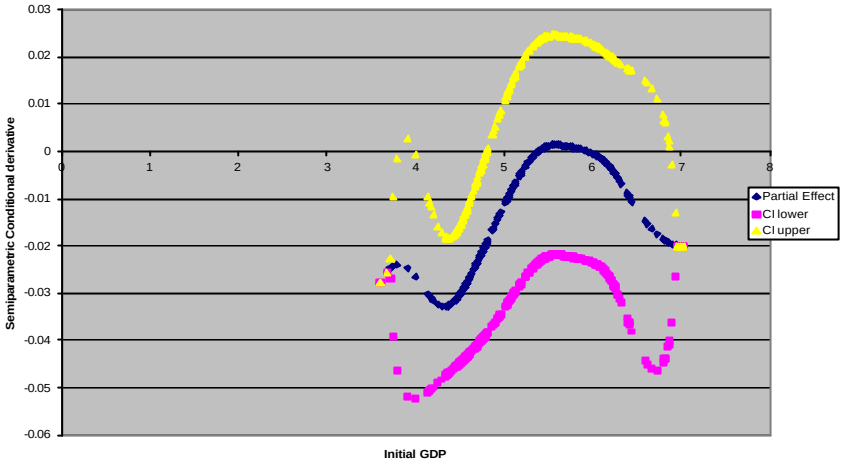

Figure 2: Manufacturing

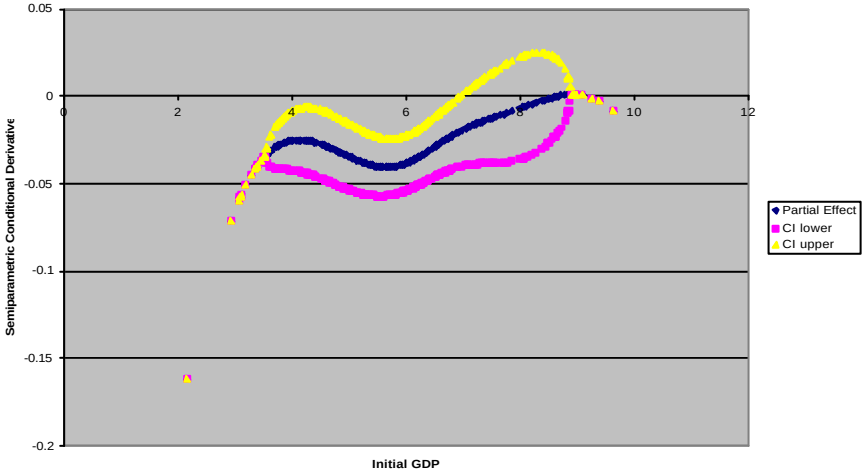

Figure 3: Services