DE TE FABULA NARRATUR?
GROWTH, STRUCTURAL CHANGE AND CONVERGENCE IN EUROPE,19th-20th CENTURIES.*

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En el cuarto trimestre de 1991, la Dirección General de Planificación abrió una línea de estudio sobre el crecimiento comparado de la economía española y convergencia con las economías más desarrolladas. Los trabajos elaborados dentro de esta línea se publican en inglés para que puedan ser leídos por los estudiosos de esta materia más allá de nuestras fronteras. En breve tiempo estará disponible una traducción castellana.

Hasta la fecha se han publicado otros cinco documentos de trabajo dentro de este programa:

D-92006: "Long-Run Economic Growth in Spain Since the Nineteenth Century: An International Perspective". Leandro Prados de la Escosura, Teresa Dabán y Jorge C. Sanz.

D-93002: "Spain's Gross Domestic Product 1850-1990: A new Series". Leandro Prados de la Escosura.

D-93003: "Growth, Convegence and Macroeconomic Performance in OECD Countries: A Closer Look". Javier Andrés, Rafael Doménech y César Molinas.

D-93005 "Technological Differences and Convergence in the OECD". Javier Andrés y José E. Boscá.

D-93008 "International and Intertemporal Comparisons of Real Product in the OECD: 1960-1990". Teresa Dabán y Rafael Domenech.

ABSTRACT

In this essay, we look at the determinants of growth and convergence in Europe over the long-run. Nineteenth and twentieth Century Europe is the **focus** of our attention providing a consistently homogeneous set of 16 countries.We incorporate resource allocation to the usual proximate determinants of growth and convergence, i.e., accumulation and the inicial level of income. The paper can be divided into three parts. In the first one, a survey of growth rates and levels of GDP per head for more than one and a half centuries is presented, and unconditional β and σ-convergence are tested against historical evidence. When all countries in our sample are considered, unconditional β-convergence appears to take place, mainly with. advanced countries and for the post 1950 period, while σ-convergence .seems to exist only for the Core. The search for patterns of development in Europe, in part two, helps to understand differences in economic performance between Core and Periphery. Although the existence of stylized patterns of development is confirmed, a clear distinction emerges between early-and late-comers, and patterns have been constructed for Core and Periphery, in which differences in accumulation, resource allocation, openness and comparative advantage are observed, confirming, to a large extent, Gerschenkron's views about the distintive performance of late-comers. Since patterns of development do not allocate weights to proximate determinants of growth, a growth accounting exercise has been carried out in the last part of the paper. The growth rate of GDP per head is associated to the initial levels of income and schooling (as a measure of human capital), changes in accumulation of physical and human capital, as well as labour, and changes in the resource allocation, plus a residual that incorporates policy and institutions. The exercise for all countries in our sample has been replicated for Core and Periphery. In all cases, conditional convergence appears stronger than unconditional one and stronger in the Core, that is, a more intense relationship exists between the growth rate of GDP per head and the initial level of income when we control for accumulation and resource allocation. Investment plays a major role in any case, but it is stronger in the Periphery. Resource allocation suggests that tying up capital and labour in agriculture was a deterrent for growth (to a larger extent in the Periphery), while opening up to international competition accelerated it. A sceptical and illuminating conclusion emerges from the essay. The relative contribution of each determinant of growth depends on the time period and group of countries considered. Identifying the sources of growth on the basis of a cross-section of countries for recent years, as it is the case of most present research, appears clearly misleading.

SUMMARY

De Te Fabula Narratur?
Growth, Structural Change and Convergence in Europe, 19th-20th Centuries.

"Quid rides? mutato nomine de te
fabula narratur"
Horace, *Satires*, I,i, v.69

I. Introduction.

The search for an optimal path of development, although commonly associated to the German Historical School, goes back to the Classical economists and can be traced back to the philosophers of the Enlightenment[1]. Adam Smith suggested a stage approach to historical development, and Marx quoted twice Horace's verses to emphasize the extent to which Britain's industrializing experience forecasted the future of Germany, by then, a late comer[2]. In the post-World War II years, long-term growth became again a major issue of research. Economists, then, looked back to history in search for a laboratory of natural experiments in which to analyse contemporary development issues[3]. Stylised facts, short-cuts towards the optimal path of development were searched by a generation of applied, historically minded economists. Clark (1940), Lewis (1954), Solow (1956, 1957), Gerschenkron (1962), Kuznets (1956/67, 1966, 1971), Chenery (1960, 1968, 1975), Rostow (1960), Denison (1962, 1967), pioneered a positive approach to the determinants of economic development. Despite their discrepancies, that can be summarized as historical *versus* cross-section approaches, they all shared a concern for a better understanding of the causes of growth and the reasons for

1 Cf. O'Brien (1975); Meier and Baldwin (1957), Schumpeter (1954).
2 Smith (1776); Marx (1867).
3 Cf. McCloskey (1981b).

divergences in economic performance across countries[4]. In the last decade, microeconomic advances in industrial organization and human capital have awakened the interest for growth among theoretical, neoclassical economists. Also, the ongoing debate on the decline in American leadership has helped the return of growth as research subject, now with a much improved data set on which to test new theories[5]. Today, growth, convergence and catching-up are back on the economist's agenda providing another excellent opportunity to re-unify economics and history, and to reconcile development economics and growth theory[6].

Convergence literature has departed from the Solow neoclassical production function and has augmented it in an attempt to allow for the determinants of growth and catching-up[7]. Fewer works, however, have gone beyond accumulation. and dared to tread into other possible determinants of growth, such as reallocation of resources (Feder (1986), Dowrick & Gemmell (1991)), openness (Knight, Loayza & Villanueva (1992), world economic integration through trade and factor migration (Williamson (1992), O'Rourke, Taylor & Williamson (1993). Moreover, institutional constraints (with the exception of Morris & Adelman (1986)) remain a residual and is not accounted for by the models. Calls to search into the social capability that may account for most differences in performance and technological diffusion and innovation continue to be unanswered (Abramovitz (1986)).

In this essay, by looking at determinants of growth and convergence in Modern Europe, we aim at contributing to build bridges between the renewed concern for growth and the empirical tradition of development economists. Europe provides a sound basis for testing empirical regularities of growth , e.g., a consistent and homogeneous set of countries, which historically have shared, to some extent, resource endowments, institutions, and economic policies. We

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4 Cf. Ranis (1984).

5 Cf. Baumol (1986); Baumol, Blackman and Wolff (1989); Williamson (1991); Nelson and Wright (1992); Rowthorn (1992).

6 On the relationship between Economics and History, cf. Fogel (1965), McCloskey (1981a, 1981b), Feeny (1987).

7 Mankiew, Romer and Weil (1992) provide a good example of such an approach: they incorporated accumulation of human capital to the Solow model. The contribution of human capital to growth is shown by earlier studies in the new convergence literature. Barro (1989) and Azariadis and Drazen (1990) find that no country was able to experience fast growth in the post World War years without a highly literate workforce. The resulting evidence is interpreted as that there is a threshold externality associated to human capital formation.

also widen the scope to earlier periods than the usual, statistically convenient post-1960 world. The sample of countries considered here represents, therefore, a better choice than the usual data set for a cross-section of countries in recent years, in which low income countries are associated to early phases of development regardless (over-time and cross-country) differences in preferences and tastes.

After surveying growth in real output per head over the last two centuries in section II, in which episodes of retardation and convergence within Europe are stressed, the hypothesis of a common European path of development has been tested through the stylised patterns of structural change designed by Chenery & Syrquin (1975) in which we allowed for differences between historical periods, such as the liberal era prior to World War I, the neo-mercantilist Interwar Years, and the post-World War II return to liberalism (section III). However, the search for uniform features of modern economic growth almost inevitably leads to a division of countries into more homogeneous groups and, thus, to identify patterns for early- and late-comers, that is, Core and Periphery within Europe (section IV). Patterns of development do not account, however, for the relative contribution of each structural variable to economic growth. A way of weighting them is provided by the literature on convergence and catching-up. In fact, a convergence-type equation, in which the rate of growth of GDP per head is related to initial levels of income, to changes in the accumulation of physical and human capital and to changes in resource allocation would permit it. In section V, we follow this procedure to establish the contribution of each development process to accelerating economic growth. Finally, some concluding remarks are presented.

II. Long-Run Growth and Convergence in Europe: An Overview.

As recent works (Maddison (1991); Williamson (1992)) tend to emphasize, convergence and catching-up are not post-World War II phenomena but can be traced well back into the early nineteenth century[8]. In fact, Maddison (1991) pushed the leader-follower story back to the 17th century. The origins of long-run growth of real output per head can be dated for Europe as far back as the

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8 Landes (1969) explained, for instance, European industrialization as a diffussion process with the leader, Britain, at the centre. It is worth mentioning the frequent use in the convergence literature of outdated ideas in economic history. For a sharp insight Cf. Crafts (1993).

early modern period (Crafts (1985), Komlos (1989)), and has been pushed far back to the middle ages ((Snooks (1990, 1993); Campbell & Overton (1991)). By the 1830's modern economic growth had already started not only in those countries commonly associated to the First Industrial Revolution (e.g., Britain, France, Belgium) but also in the Periphery (e.g., Spain, Sweden). Tables 1-3 show annual rates of growth and absolute and relative levels of GDP per head since the early 19th century for a large sample of European countries. Several features are worth noticing. Moderate rates of growth are observed for all conventional periods if the so called Golden Age, i.e., 1950-1973, is excluded. In fact, when placed into the long-run perspective, this long boom is an atypical episode in the history of growth. For the period 1850-1990, the unweighted average rate of growth in a sample of sixteen countries was below 2 per cent, and roughly over 1 per cent for the century prior to 1950. Dispersion of growth rates across countries is an interesting feature. For example, Southern nations, e.g., Greece, Italy, Portugal, and Spain, plus Ireland, grew below the European average not only before 1870, but in the interwar years and in the post-1973 period, that is, in those phases of slackening growth[9]. Conversely, they grew faster during the years 1950-1973, and, ocassionally, in the period 1870-1913[10]. On the whole, most late-comers or peripheral countries tended to fall behind the average growth rate during the 19th century and above it in the (late) 20th century[11].

Evidence on growth rates requires, to make sense, to be related to the initial levels of *per capita* income. As Gerschenkron (1962) put it, the initial level of development conditioned subsequent growth in 19th Century Europe. GDP per head is expressed here in 1990 U.S. dollars (at purchasing power parity) and, therefore, our national estimates suffered from a serious index

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9 Exceptions are Spain and Greece from 1914 up to 1929, and Italy and Ireland after 1973.

10 For instance, Spain in 1870-1890, and Italy in 1890-1913.

11 As peripheral are defined those countries that, by 1950, had not reached the U.K.'s 1913 income per head, e.g., Austria, Checoslovakia, Finland, Greece, Hungary, Ireland, Italy, Norway, Portugal, Russia and Spain (measured in US 1990 dollars PPP). Only market economies have been considered and, subsequently, Checoslovakia and Hungary are excluded since 1950, and Russia since 1920.

TABLE 1

REAL GDP PER HEAD GROWTH IN EUROPEAN COUNTRIES, 1850-1990
(ANNUAL RATES, EXPONENTIAL FITTING)

	1830-1850	1850-1870	1870-1890	1890-1913	1913-1929	1919-1938	1950-1960	1960-1973	1950-1973	1973-1990	1850-1913	1913-1950	1950-1990	1850-1938	1850-1950	1913-1990	1850-1990
AUSTRIA	0.70	0.69	1.23	1.54	1.84	0.99	5.94	4.17	4.68	2.13	1.37	0.34	3.72	0.79	0.65	2.65	1.61
BELGIUM	NA	1.84	1.08	0.95	2.17	1.13	2.19	4.19	3.43	1.83	1.09	0.63	3.05	0.90	0.78	2.06	1.38
DENMARK	1.47	0.52	1.03	1.98	1.76	2.14	2.31	3.42	3.39	1.95	1.48	1.36	2.70	1.56	1.48	2.21	1.84
FINLAND	NA	NA	0.68	1.85	2.65	3.40	3.36	4.19	3.98	2.74	1.39	2.51	3.55	1.48	1.62	3.12	2.31
FRANCE	1.15	1.36	0.71	1.28	2.69	1.66	3.50	4.24	3.99	1.76	1.11	0.56	3.17	1.14	0.93	2.53	1.74
GERMANY	0.87	1.27	1.12	1.69	1.81	2.71	6.69	3.37	4.57	1.94	1.52	1.52	3.29	1.22	1.23	2.81	1.97
GREECE	NA	NA	NA	NA	2.41	1.52	4.96	6.78	6.06	1.58	NA	0.66	4.43	NA	NA	2.79	NA
IRELAND	NA	NA	NA	NA	0.28	1.05	2.16	3.69	3.06	2.65	NA	0.75	2.87	NA	NA	2.14	NA
ITALY	NA	NA	0.52	1.53	0.85	1.34	4.75	4.30	4.62	2.43	0.72	0.59	3.71	1.16	1.10	2.56	1.82
NETHERLANDS	NA	1.43	-0.05	1.56	2.88	0.94	3.29	3.80	3.43	1.11	1.08	0.37	2.63	1.20	0.85	2.06	1.70
NORWAY	NA	NA	0.66	1.28	1.82	2.77	2.54	3.35	3.14	3.05	1.04	2.06	3.31	1.49	1.58	2.82	2.20
PORTUGAL	NA	-0.28	0.85	0.39	0.83	1.59	3.87	6.45	5.40	1.85	0.66	1.42	3.75	0.69	0.79	3.12	2.04
SPAIN	NA	0.86	1.24	0.89	1.95	1.47	3.68	5.50	4.79	1.42	1.03	-0.02	3.55	1.00	0.77	2.05	1.28
SWEDEN	0.30	0.89	0.76	1.76	1.58	2.89	2.45	3.28	3.20	1.60	1.36	2.53	2.53	1.31	1.53	2.71	2.05
SWITZERLAND	NA	NA	1.18	1.28	2.88	2.07	3.03	2.84	2.97	1.22	1.21	2.02	2.05	1.46	1.60	2.40	2.16
U.K.	1.30	1.65	0.91	0.87	-0.48	1.34	2.23	2.37	2.39	1.92	1.03	1.06	2.14	0.79	0.88	1.69	1.24
CHECOSLOVAKIA	NA	NA	NA	NA	2.31	2.17	NA										
HUNGARY	NA	NA	NA	NA	0.67	2.26	NA										
RUSSIA	NA	NA	NA	2.13	NA	NA	NA										

Sources: Appendix A.

TABLE 2

GDP PER HEAD IN EUROPE
(1990 USA $ PPP)

	D	OST	B	DK	E	FIN	F	GR	NL	IRL	I	N	P	UK	S	CH	CHE	HUN	RUS
1820	933			1169			1064							1458					
1830	1056	1398		1232			1171							1728	1257				
1840		1501		1303			1337							1956					
1850	1257	1608	1781	1654	1195		1475		1870				840	2241	1335				
1860	1442	1771	2252	1614	1418	951	1618				1514		657	2839	1376				
1870	1619	1847	2572	1836	1388	1095	1935		2490		1568	1229	795	3115	1596	2476			
1880	1759	2061	2923	2000	1836	1110	2218		2781		1651	1363	760	3395	1771				771
1890	2150	2423	3269	2313	1862	1327	2393		2464		1743	1525	942	3913	2001	3134			839
1900	2653	2858	3558	2766	2078	1603	2851		3427		1828	1663	1128	4385	2457	3469		2170	1158
1910	2986	3263	3875	3397	2137	1832	2944		3574	2511	2092	1936	1040	4501	2859	3997			1305
1913	3245	3436	4024	3587	2407	2028	3360	1182	3833	2429	2347	2146	1066	4804	2970	4134	2496	2778	1369
1920	2528	2392	3778	3660	2394	1773	3129		3995		2631	2386	1050	4440	2688	4180	2195	2183	
1925	3194	3339	4449	4014	2764	2237	4040		4763	2454	2919	2531		4689	3102	5221	3000	2434	
1929	3644	3668	4820	4653	3035	2610	4567	1739	5385	2564	3166	2980	1210	5016	3712	6136	3612	3093	
1933	3215	2809	4463	4850	2840	2596	4110	1773	4692	2680	3099	3153		4810	3570	5781	2878	2801	
1938	4831	3530	4608	5283	2893*	3449	4330	1988	4970	2815	3583	3723	1399	5713	4533	6192	3245	3281	
1950	4267	3675	5209	6221	2396	4087	5110	1422	5676	3153	3630	4689	1753	6537	6464	8782			
1955	6409	5011	5989	6597	3018	4994	6119	1906	6935	3603	4699	5416	2155	7455	7258	10529			
1960	8437	6464	6604	7918	3957	5987	7314	2336	7845	3915	5934	6179	2582	8339	8334	12071			
1965	10073	7669	8168	9854	5625	7370	9068	3347	9275	4631	7317	7460	3448	9410	10375	14054			
1970	11896	9667	10142	11396	7186	9203	11313	4613	11322	5672	9562	8607	4729	10404	12199	16379			
1975	12991	11549	11821	12237	8864	10980	12824	5735	12649	6692	10649	10454	5653	11371	13608	16572			
1980	15321	13674	13660	13676	9175	12558	14662	6663	13899	7813	13162	12979	6794	12438	14327	18196			
1985	16313	14578	14174	15618	9553	14130	15439	6911	14258	8514	13932	15058	6828	13619	15610	19053			
1990	18291	16620	16405	16765	11733	16453	17431	7349	15766	10659	16021	15921	8389	15720	16867	20997			

D:	GERMANY	**OST:**	AUSTRIA	**B:**	BELGIUM	**DK:**	DENMARK	**CHE:**	CHECOSLOVAKIA
E:	SPAIN	**FIN:**	FINLAND	**F:**	FRANCE	**GR:**	GREECE	**HUN:**	HUNGARY
NL:	NETHERLANDS	**IRL:**	IRELAND	**I:**	ITALY	**N:**	NORWAY	**RUS:**	RUSSIA
P:	PORTUGAL	**UK:**	UNITED KINGDOM	**S:**	SWEDEN	**CH:**	SWITZERLAND		

Sources: Text and Appendix A.
Note: * Spain's data refer to 1935

TABLE 3

REAL GDP PER HEAD IN EUROPE (U.K. = 100)

	D	OST	B	DK	E	FIN	F	GR	NL	IRL	I	N	P	UK	S	CH	CHE	HUN	RUS
1820	64			80			73							100					
1830	61	81		71			68							100	73				
1840		77		67			68							100					
1850	56	72	79	74	53		66		83				37	100	60				
1860	51	62	79	57	50	34	57				53		23	100	48				
1870	52	59	83	59	45	35	62		80		50	39	26	100	51	79			
1880	52	61	86	59	54	33	65		82		49	40	22	100	52				23
1890	55	62	84	59	48	34	61		63		45	39	24	100	51	80			21
1900	61	65	81	63	47	37	65		78		42	38	26	100	56	79		49	26
1910	66	73	86	75	47	41	65		79	56	46	43	23	100	64	89			29
1913	68	72	84	75	50	42	70	25	80	51	49	45	22	100	62	86	52	58	29
1920	57	54	85	82	54	40	70		90		59	54	24	100	61	94	49	49	
1925	68	71	95	86	59	48	86		102	52	62	54		100	66	111	64	52	
1929	73	73	96	93	61	52	91	35	107	51	63	59	24	100	74	122	72	62	
1933	67	58	93	101	59	54	85	37	98	56	64	66		100	74	120	60	58	
1938	85	62	81	92	51	60	76	35	87	49	63	65	24	100	79	108	57	57	
1950	65	56	80	95	37	63	78	22	87	48	56	72	27	100	99	134			
1955	86	67	80	88	40	67	82	26	93	48	63	73	29	100	97	141			
1960	101	78	79	95	47	72	88	28	94	47	71	74	31	100	100	145			
1965	107	82	87	105	60	78	96	36	99	49	78	79	37	100	110	149			
1970	114	93	97	110	69	88	109	44	109	55	92	83	45	100	117	157			
1975	114	102	104	108	78	97	113	50	111	59	94	92	50	100	120	146			
1980	123	110	110	110	74	101	118	54	112	63	106	104	55	100	115	146			
1985	120	107	104	115	70	104	113	51	105	63	102	111	50	100	115	140			
1990	116	106	104	107	75	105	111	47	100	68	102	101	53	100	107	134			

D: GERMANY **OST:** AUSTRIA **B:** BELGIUM **DK:** DENMARK **CHE:** CHECOSLOVAKIA
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Sources: Table 2.

Note: * Spain's data refer to 1935.

number problem, since they have been built by projecting backwards 1990 levels (calculated at international prices) with each country growth rates (estimated at national prices). They provide, however, in our opinion, the best short-cut method for comparisons across countries and over time[12]. Differential growth rates reflect upon relative levels of real product per head. The simultaneous information on growth rates and levels of income per head brings the question of whether there was catching-up or unconditional convergence in Europe, that is, an inverse relationship between initial levels of income and their growth rates. In this regard, two concepts of convergence should be distinguished. On the one hand, β- convergence applies if a poor country tends to grow faster than a rich one, so that, *caeteris paribus*, the poor country tends to catch up with the rich one in terms of income per head. On the other, σ-convergence concerns cross-sectional dispersion. In this context, convergence occurs if the dispersion, as measured by, say, the standard deviation of logs of *per capita* income across countries, declines over time.[13].

Our panel data for 25 benchmarks over 1820-1990 (see Table 2) allow us to test unconditional β-convergence over a long time-span by taking each country's growth rate of real product per head over ten and twenty year periods alternatively, as the dependent variable, and the log of *per capita* income (Y_{it}) at each initial level, as the independent variable, plus a time trend dummy to capture temporal changes in the dependent variable not associated with variations in the independent variable (and to eliminate all variation between time periods that makes the result correspond to that of a weighted average cross-section). The speed of convergence is about 1.3% per year for the entire sample[14]. The speed of convergence was over 2.6% per year for the Core (10 year periods) and only 1.3% for the Periphery.

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12 Williamson's (1992) pathbreaking research on real wages appears most promising but the number of countries covered is not large enough for European comparisons. An alternative benchmark for the pre-World War II period would be *per capita* income expressed in 1913 sterling pounds derived from trading exchange rates. Intuition about a narrow gap between PPP and trading exchange rates in the Gold Standard would support this option. Cf. Eichengreen (1986) and O'Brien and Prados de la Escosura (1992) for further discussion.

13 β -convergence works towards σ -convergence, but this is a necessary, though not a sufficient condition for it. Cf. Barro and Sala i Martin (1992).

14 The formula used following Barro and Sala i Martín (1992), is $\left(1-e^{-\beta T}\right)/T = b$ were T is the time span and b the coefficient for the log of the initial income level.

TABLE 4

UNCONDITIONAL β-CONVERGENCE IN EUROPE. 1820-1990

-pool regressions-
Dependent Variable: Annual growth rate of GDP per head
Estimation method: TSLS

	ALL COUNTRIES		CORE		PERIPHERY	
	10 year periods	20 year periods	10 year periods	20 year periods	10 year periods	20 year periods
Constant	0.0811	0.0761	0.1620	0.1148	0.0731	0.0627
	(5.490)	(5.060)	(5.475)	(3.920)	(3.257)	(2.274)
Log (Y_{t_T})	-0.0119	-0.0113	-0.0230	-0.0164	-0.0123	-0.0111
	(-5.392)	(-5.081)	(-5.354)	(-3.776)	(-3.513)	(-2.577)
Time	0.0003	0.0003	0.0004	0.0004	0.0004	0.0004
	(8.944)	(8.690)	(6.681)	(5.514)	(6.744)	(5.604)
Adj. R^2	0.364	0.383	0.360	0.432	0.447	0.460
N° Obs.	163	134	91	60	72	48
Speed of convergence	0.0127	0.0129	0.0262	0.0199	0.0132	0.0125

ALL COUNTRIES

	PRE-WORLD WAR I		PRE-WORLD WAR II		POST-WORLD WAR II	
	10 year periods	20 year periods	10 year periods	20 year periods	10 year periods	20 year periods
Constant	0.0174	-0.0049	0.0412	0.0099	0.1786	0.1832
	(0.885)	(-0.304)	(1.821)	(0.606)	(8.942)	(6.827)
Log (Y_{t_T})	-0.0014	0.0019	-0.0054	-0.0006	-0.0156	-0.0153
	(-0.522)	(0.831)	(-1.681)	(-0.254)	(-5.058)	(-3.985)
Time	0.0001	0.0003	0.0002	0.0001	-0.0001	-0.0001
	(1.363)	(0.760)	(3.818)	(2.741)	(0.380)	(-0.499)
Adj. R^2	-0.002	0.008	0.120	0.112	0.474	0.415
N° Obs.	71	45	99	59	64	48
Speed of convergence	0.0015	0.0019	0.0056	0.0006	0.0170	0.0183

CORE

	PRE-WORLD WAR I		PRE-WORLD WAR II	
	10 year periods	20 year periods	10 year periods	20 year periods
Constant	0.0666	0.0741	0.1549	0.0872
	(1.821)	(2.996)	(3.567)	(3.555)
Log (Y_{t_T})	-0.0084	-0.0094	-0.0213	-0.0112
	(-1.593)	(-2.626)	(-3.434)	(-3.240)
Time	0.0002	0.0002	0.0003	0.0002
	(1.954)	(2.958)	(4.294)	(4.142)
Adj. R^2	0.040	0.202	0.222	0.308
N° Obs.	45	28	59	35
Speed of convergence	0.0088	0.0104	0.0240	0.0127

(t-ratios in parentheses)
Instruments: Constant, Log ($Y_{t_{T-1}}$), Time.

It appears, at first glance, that unconditional, though *mild* β-convergence, or catching-up, took place for our sample of countries over the time span considered. The negative sign for initial relative income is the expected one but the low R^2 suggests that, at least, 50 per cent of the variance requires a different, more complex explanation. A closer look to groups of countries, or historical phases, allow us to qualify the broad view. Unconditional β-convergence was stronger for Core than for Peripheral countries, and more important, the convergence process only seems to be an unchallenged phenomenon for the post-World War II era, when the speed of convergence was 1.7%. When a distinction between Core and Periphery is introduced, a convergent process can be suggested for the pre-World War I Core with a speed of convergence of 0.88% (and 2.4% for the entire pre-World War II era).

Alternatively, a test for σ-convergence has been performed for our country sample for 1850-1990. Graph 1 shows the (unweighted cross-sectional) standard deviation, σ_t, for the log of *per capita* income in a sample of countries whose data for 1860 to 1990 are available[15]. The broad observation from Graph 1 is a long run decline in σ_t, from a value above 0.28 to a plateau around 0.10. The dispersion of personal income fell from 0.28 in 1860 till 0.18 in 1938 and, then, rose to 0.27 in 1950, as a reflection of the external shock produced by World War II (and as it had already occurred after the Great War). Afterwards, a sharp decline took place, only to become sustained since 1960, that reversed after the 1973 crisis, with σ_t rising up to 1985, to fall thereafter. A shortcoming of Graph 1 is that most countries covered are part of the Core and, therefore, it does not provide a good historical picture of cross-sectional dispersion of *per capita* income in Europe as a whole. Thus, we computed σ_t only for Core countries for the period 1850-1990[16]. Graph 2 shows that now the dispersion of personal income fell from 0.26 in 1860 to 0.08 in 1990. Therefore, when Peripheral countries are excluded, σ-convergence is more intense. Moreover, the sharp decline in σ_t from 1950 till 1990 was not reversed in the mid-1970's. So, oil shocks affected more negatively σ-convergence in the Periphery. Actually, when all countries in our sample (see Table 2) are considered, excluding only Greece and Ireland, a complete lack of convergence

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15 The sample in Graph 1 includes Austria, Belgium, Denmark, France, Finland, Germany, Italy, the Netherlands (only since 1870), Spain, Sweeden, and the United Kingdom.

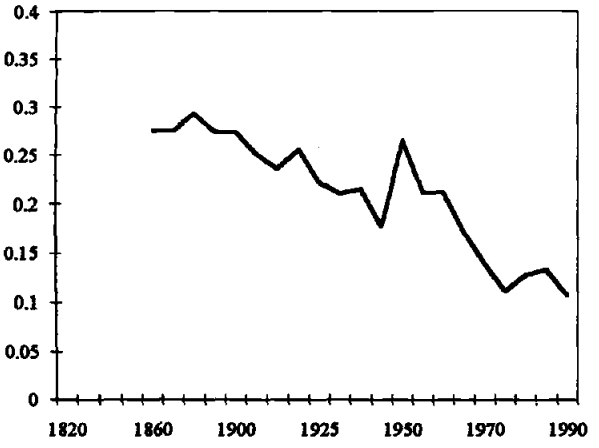
16 Within this sample (Graph 2) are included Belgium, Denmark, France, Germany, Netherlands, Sweeden, Switzerland, and the U.K..

σ-CONVERGENCE IN EUROPE, 1850-1990

Unweighted cross-sectional standard deviation of the log of GDP per head

GRAPH 1

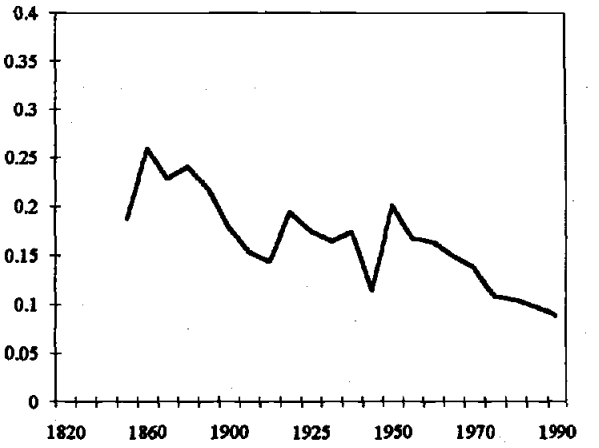
EUROPEAN COUNTRIES
(Data available for the entire time span)*



* See footnote 16

GRAPH 2

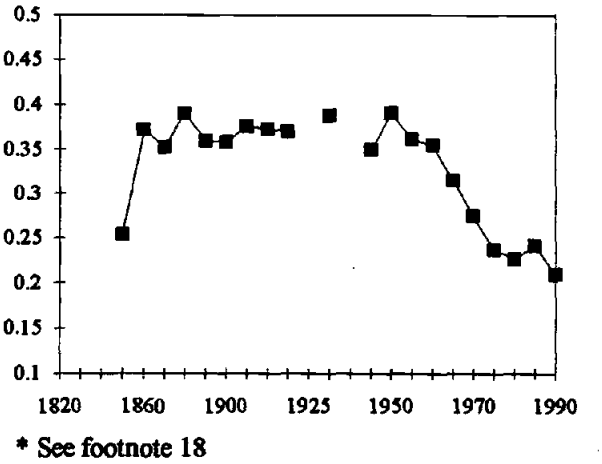
CORE*



* See footnote 17

GRAPH 3

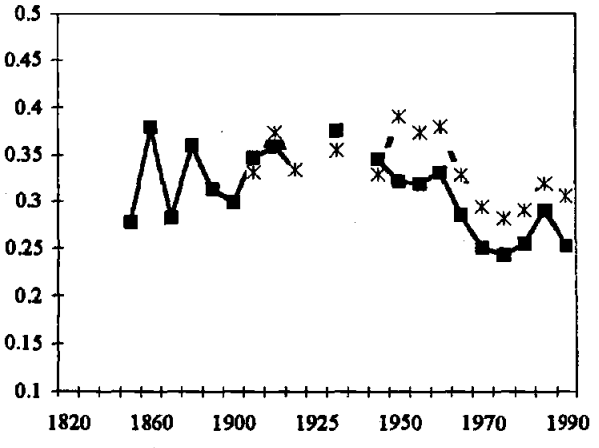
ALL EUROPEAN COUNTRIES*



* See footnote 18

GRAPH 4

PERIPHERY*



* See footnote 19

emerges for the century before 1950 (Graph 3)[17]. Thereafter, a milder convergent process took place, interrupted in the 1970's. Finally, when only Peripheral countries are taken, the dispersion not only was very high but did not decline significantly over the 1850- 1990 period (Graph 4).[18]

It could be suggested, as a consequence, that the Periphery's failure to converge, in terms of unconditional β and σ-convergence, could be linked to its inability to adjust more succesfully to periods of deceleration, in which the Peripheral countries fared far worse than those of the Core. Policy, institutions, and resource endowments should account for such a distinctive Peripheral behaviour. A comparison of patterns of structural change within Europe might be more illuminating.

III.- Historical Patterns of Development in Europe: A Chenery-Syrquin Approach.

Modern economic development can be seen as an identifiable process of growth and change whose main features are the same in all countries (Solow (1977:491). The rationale for this approach, as exposed by Kuznets:

"is conditioned on the existence of common, transnational factors, and a mechanism of interaction among nations that will produce some systematic order in the way modern economic growth can be expected to spread around the world".[19]

Economic development can, therefore, be defined as "an interrelated set of long-run processes of structural transformation that accompany growth" (Syrquin (1988:205)). The structural transformation consists of a set of changes in the composition of demand, production, trade, and employment, each reflecting different aspects of shifts in resource allocation that takes place as income levels rise. Thus, a pattern of development may be defined, as any systematic variation in the economic and social structure associated to a rising

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17 No income data is available for Greece and Ireland before 1913. Besides, observations for 1925 and 1933 were eliminated in Graph 3 to maintain consistency in our estimates since no data was available for Portugal.

18 Two lines have been plotted in Graph 4, the dotted one referring the 20th century only, that is, including Greece and Ireland, and the other referring the peripheral countries except Greece and Ireland and from 1850 to 1990.

19 Kuznets (1959), p. 170.

level of income. Structural changes associated to the rise in real product per head interact with the pattern of productivity growth in a general equilibrium system to determine the rate and pace of growth (Syrquin (1986a:436-437)).

A decade ago, Crafts (1984), on the basis of better data and using PPP estimates of real *per capita* income for a large sample of countries, established the existence of patterns of development for 19th Century Europe along the lines of those constructed by Chenery & Syrquin (1975) for the post-World War II era. Simultaneously, Adelman & Morris (1984) carried out a similar exercise for an international pre-1914 sample including non-European countries. Here, we attempt to derive long-run patterns of development for Modern Europe that provide a wider picture, since the 20th century is also covered, and might prove particularly useful for assessing modern economic growth among late-comers. Besides, a longer temporal coverage will allow us to put Gerschenkron's qualifications about the distinctive path of development followed by Peripheral nations to the test.

In the Clark/Kuznets tradition, the patterns of development rely on theoretical findings but are mostly rooted in stylized facts, that is, "income-related changes for which the available evidence suggests considerable uniformity but for which there is yet no well defined body of theory" (Chenery & Syrquin (1975:6)). In fact, they lack an *a priori* model and their method is inductive. In the patterns of development framework, each country is treated as an integrated, interdependent component of the European economy. Such an assumption is acceptable after 1846 (the repeal of the Corn Laws), when the basis of the liberal international order was established. By then, however, more than three centuries of mercantilism, warfare and experience with internal and imperial markets had placed the countries of Europe at rather diverse levels of development.

The development patterns approach has, nonetheless, been subjected to serious criticism[20]. It has been argued that Chenery-Syrquin equations derive from an unspecified model of development in which we cannot tell supply from demand determinants of industrialisation. Moreover, the argument follows, they do not reveal a unique path to industrialisation since comparative advantage, policy and institutions matter. A country's trade and production patterns, as

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20 Cf. for instance, Díaz Alejandro (1976) and Perkins (1981).

Bhagwati (1977:491) reminded us , are "the result of an interaction between the country's own endowments and demands and the rest-of-the-world's endowments and demands", a fact apparently not accounted for in the Chenery patterns. The challenge, therefore, would be, instead, to assess the ability of an economy to reach its full potential, that is, to come close to optimal growth (Williamson (1986)). However, in the analysis of Chenery & Syrquin's development patterns there is not the implication that a single, unique path, through which all economies have to pass, would exist. On the contrary, Chenery & his associates were always aware that, by treating development within a uniform framework, it would be possible to identify systematic differences in development patterns among nations. As Chenery (1988:60) put it, "The search for uniform features of development almost inevitably leads to a division of countries into more homogeneous groups". In fact, Chenery & Syrquin (1975:5) distinguish two components of a country's pattern of development: the normal effect of universal factors (that accounts for most of the observed structural variation among countries) and the effects of a country's individual history (that can be more readily evaluated after allowing for the uniform elements in each development pattern).

In any case, the only feasible way to approach historical reality, as Gerschenkron (1962) wrote, is through the search for certain regularities or uniformities, and the analysis of deviations to the norm. Since development occurs with sufficient uniformity among countries to produce a consistent pattern of change in resource allocation, factor use, and other structural features as the level of *per capita* income rises, we have selected a set of basic processes only restricted by the lack of empirical evidence[21]. All variables are expressed as shares (of GDP, total employment, etc.) since it is the relative variation which determines structural change. Shares are calculated at nominal prices since the decisions of individuals and firms are more meaninfully analysed at current, rather than at constant, prices. The development processes studied can be divided into three main categories: a) **accumulation**, that deals with the resources used to increase an economy's productive capacity, for which we have gathered information on stocks (literacy) and on increases in stocks (gross domestic investment and school enrollment); b) interacting with accumulation, **resource allocation**, which produces systematic changes in the sectoral composition of domestic demand, foreign trade, production, and

21 Chenery and Syrquin (1975), p.11.

employment, as real product per head rises[22] ; c) **demographic transition**. Here they are summarized:

1. Domestic Demand (percentage of GDP): gross domestic investment, private consumption, and government consumption.
2. Education: primary and secondary school enrollment (percentage of population aged 5 to 19) and literacy (percentage of population over 7 years old).
3. Output Structure (percentage of GDP): value added in agriculture, industry (including mining, construction and utilities), and services.
4. Labour Allocation (percentage of total labour force): labour force in agriculture, industry, and services.
5. Foreign Trade (percentage of GDP): exports, imports, openness (exports+imports), primary exports, manufactured exports.
6. Urbanization (percentage of population in towns over 20,000 inhabitants).
7. Demographic transition: crude birth and death rates (per thousand inhabitants), gross fertility (children per woman), infant mortality (per thousand births), net fertility[23].

Data on structural change across Europe derives mostly from national sources, in particular, from reconstructed national accounts. Appendix A provides a detailed account of the sources used. A major feature of the data set is that non-market economies have been excluded given the data problems involved (different concepts, low reliability, and, the most important factor from the economists' point of view, a different set of incentives from those existing in the Western world).

III.1.The Construction of Patterns of Development.

In this section we discuss the econometric methods used for the construction of development patterns. We depart from the method designed by Chenery & Syrquin (1975), and, as in their case, since the statistical procedure has to apply to a wide range of development processes and countries, the scope

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22 As Chenery & Syrquin (1975), p. 33 put it, "theses patterns result from the interaction between the demand effects of rising income and the supply effect of changes in factor proportions and technology".

23 Net fertility = (1 - infant mortality rate) * gross fertility.

for a more refined econometric specification is constrained by the limited availability of data.

A major goal of this essay is to separate the effects of universal factors, common to all countries, from particular characteristics of each one, in order to stress divergence from the European pattern of development. We, therefore, assume that any indicator of structural change, $\mathbf{I_{it}}$, for **i**=country, and **t**=time period, can be divided into two different parts:

$$\mathbf{I_{it}} = \mathbf{f_1}[\alpha, \mathbf{U_{it}}] + \mathbf{f_2}[\beta_i, \mathbf{V_{it}}] \qquad (1)$$

where, α is a $\mathbf{k*1}$ vector of time and cross-country invariant parameters; $\mathbf{U_{it}}$ is a vector of explanatory variables representing the level of development, market size, economies of scale, etc. in country **i** at period **t**; β_i is a time invariant but cross-country variant vector of parameters; and $\mathbf{V_{it}}$ represents a set of explanatory variables, including a stochastic disturbance (which incorporates wars, political unifications, etc). $\mathbf{U_{it}}$ adds to the explanatory variables in Chenery & Syrquin (1975), others for the country size and a time-trend component:

$$\mathbf{U'_{it}} = [\mathbf{c}, \mathbf{LnY_{it}}, \mathbf{(LnY_{it})^2}, \mathbf{LnN_{it}}, \mathbf{(LnN_{it})^2}, \mathbf{INFL_{it}}, \mathbf{LnSize_i}, \mathbf{TREND_t}] \qquad (2)$$

where **c** is a constant term; $\mathbf{Y_{it}}$, real income per head; $\mathbf{N_{it}}$, population; $\mathbf{INFL_{it}}$, net imports (imports-exports of goods) as a share of GDP; $\mathbf{Size_i}$, country **i**'s extension in km^2; $\mathbf{TREND_t}$, time trend dummy.

Under these conditions, $\mathbf{f_1}(\alpha, \mathbf{U_{it}})$ will be the part of the structural variable $\mathbf{I_{it}}$ that can be explained by the pattern of development common to all countries, while the divergence of country **i** from the pattern will be $\mathbf{f_2}(\beta_i, \mathbf{V_{it}})$. Then, assuming that α exists is the same as assuming that a common pattern does exist. Next, we must establish the necessary assumptions in order to estimate the patterns of development properly. Following Chenery & Syrquin (1975) we have preferred the semi-log formulation to the double-log one to retain the additive property for the different components of aggregates (i.e., sectoral shares of output must add to 100). In addition, we will assume that $\mathbf{f_1}(\alpha, \mathbf{U_{it}}) = \alpha * \mathbf{U_{it}}$. Under these conditions, we have:

$$I_{it} = \alpha_0 + \alpha_1 * LnY_{it} + \alpha_2 * (LnY_{it})^2 + \alpha_3 * LnN_{it} + \alpha_4 * (LnN_{it})^2 + \\ + \alpha_5 * INFL_{it} + \alpha_6 * LnSize_i + \alpha_7 * TREND_t + f_2(\beta_i, V_{it}) \quad (3)$$

Following Chenery & Syrquin (1975), income per head works as an overall index of development and as a measure of output. Population represents the market size and tries to capture the effect of economies of scale and transport costs on patterns of production and trade. These effects are independent of the income level, since no correlation is expected between market size and level. In addition, quadratic terms are included to allow for non-linearities. In our sample, each country's population size changes substantially as our time coverage is very wide, and a new country-size variable that represents the surface of the country helps to control for it, while it works at the same time as a country-dummy. The time-trend variable should capture universal changes over time not associated with the other independent variables (e.g., institutions, policies, etc.) that affect all countries alike. The time-trend dummy eliminates all variation between time periods so that the original panel data sample can easily be treated like a simple pool of cross-section data, as regards the econometric approach.

Our target now will be to estimate the $[\alpha_0, \alpha_1, \alpha_2, \ldots \alpha_7]$ vector. For this estimate to be consistent, we will assume that there is no correlation between variables included in U_{it} and V_{it}. This is a very strong assumption that may not be true in practice and, therefore, we must be very cautious when interpreting the econometric results. To avoid this problem, we could have assumed that $V_{it} = V_i$, $\forall t$ and $f_2(\beta_i, V_i) = \beta'_i * V_i$. This linear specification would permit us to eliminate the term $f_2(\beta_i, V_i)$ taking deviations with respect to the mean in the time-varying dimension (within-group estimator). But, in that case, we also get rid of α_0. That would not be a major problem if we were sure that α_0 is really a constant because, in that case, we could use several estimation techniques consistently. However, it is easy to guess that α_0 will present several structural changes in its long time-varying dimension, and testing this hypothesis is another goal of this essay. For such a reason, we finally decided to assume the lack of correlation between U_{it} and V_{it}, and to go on with our initial specification. If our assumption holds true, we will be able to isolate additively and consistently the part of the structural variable that can be explained by a common pattern of development, and obtain $f_2(\beta_i, V_{it})$ as a residual that measures the particular divergence of each country's structural indicator from

the pattern. The formulation described so far is what we call the single pattern because the time-varying regressors are supposed to have homogeneous effects on each structural variable over the whole time span. A second approach has been introduced to test and, in its case, to analyse the existence of structural changes in the constant term and in the slopes of **LnY** and **LnN** in different sub-periods of our sample. This method allows us to go beyond the time-trend dummy that stands for an exogenous uniform shift but is unable to discriminate among periods (Chenery & Syrquin (1975:154)). The outcome is the adjusted pattern. Three historical periods were chosen to test structural breaks: the period prior to World War I, the Interwar years, 1920-1938, and the post-World War II period up to 1990.

To allow for different possibilities of structural change over these historical periods, the following dummy variables were defined:

TABLE 5

D13: value 1 from 1820 to 1913, and 0, thereafter.
D2090: value 0, 1820-1913; 1, 1920-1990.
D38: value 1, 1820-1938; 0, thereafter.
D5090: value 0, 1820-1938; 1, 1950-1990.
D2038: value 0, 1820-1913 and 1950-1990; 1, 1920-1938.
LnY13= D13*lnY
LnY38=D38*LnY
LnY2038=D2038*LnY
LnN13= D13*lnN
LnN38=D38*LnN
LnN2038=D2038*LnN

III.2. Analysis of the Econometric Results.

The econometric results for both single and adjusted patterns, presented in Appendix B, deserve some comments. For the composition of demand, both coefficients of income and population present the expected sign, as income is negatively related to consumption (total and private) and positively to domestic investment, while the opposite occurs to population. Size and trend dummies also correlate positively to investment and negatively to consumption (only to private consumption for the time trend). Larger countries appear to invest more at given levels of income and investment rates increase as time goes by, regardless of income (while the opposite happens to private consumption). In the adjusted patterns, a dummy variable for the slope of **LnY** in different periods allow us to locate structural breaks, from which emerges that, for investment, the estimated coefficient of income reached the highest value in the post-World War II era, and the lowest in the interwar years. The same happens (but with a negative sign) to private consumption, with larger absolute values for the post-1950 period, and a positive coefficient for the interwar years.

The supply side offers the expected correlation between income and population on the one hand, and agricultural shares in output and employment on the other, i.e., negative for income and positive for population, while a positive one appears for industry shares in output and employment with respect to income[24]. When the estimated coefficient on the quadratic term shows an opposite sign to that of the linear term, it means that the relation between structural change and income level attenuates as GDP per head rises. The time-trend and size dummies show a tendency for agricultural shares in output and employment, independently from the level of income (while the opposite tendency is observed for industry). In the case of agriculture, the estimated coefficient for income, negative, is higher in absolute terms for the period prior to World War I (as the adjusted coefficients reveal), and thus reinforces a Gerschenkronian feature of late-comers' agriculture.

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24 When quadratic terms exist, the resulting overall value has been obtained by weighting coefficients for quadratic and non quadratic terms with income values ranging from 1,000 to 15,000 US dollars at 1990 prices (PPP). Not clear relationship appears for population and industry shares in output and employment (positive for the single pattern, negative for the adjusted pattern). For services shares, there is a negative correlation for population, while for income it is only negative for the single pattern.

Urbanization, as expected, is positively related to income and population, and negatively to the country's size. Net imports also show a direct relationship with urbanization. Human capital indicators (school enrollment and literacy) consistently show positive correlations with income and negative ones to population and size. The time trend appears to be positive for primary and secondary schooling although the income coefficient was higher before World War I.

The demographic transition shows the expected negative relation to income for birth and death (including infants). For the adjusted pattern, fertility (both gross and net) is positively related to income. Such a result suggests that findings for the post-1960 world, i.e., a negative relation between net fertility and income (Barro (1991:422)), cannot be simply extrapolated to earlier periods in which economic development helped to reduce infant mortality and, therefore, increased net fertility. A clear negative time trend appears for all demographic indicators.

Finally, foreign trade indicators unanimously show a positive relation to income (with larger estimated coefficients as time goes by), and a negative one to population and size, as well as a negative time trend. The exception is the positive link between population and manufacturing exports that might suggest a Linder's (1961) scenario of representative demand, in which producing industrial goods for home consumption appears as a pre-requisite for exporting them.

III.3. Normal Structural Variation with the Level of Development.

Structural changes associated with a rise in *per capita* income can be derived from the econometric results summarized in Appendix B. The fitted values represent the European patterns (i. e., the evolution of the different structural indicators, once the country specific features have been removed), and it could be useful to show how these structural variables change as income per head increases. In order to construct normal variations in economic structure, associated to increases in GDP per head, we regressed our pool of forcasted values for each structural variable, derived from equations in Appendix B, on their corresponding (logs of) levels of income per head, as a way of summarizing their relationship. Scattered diagrams representing

conditional association between each indicator of structural change and GDP per head are shown in Appendix C.

Table 6 and Graphs 5-15 present the structural transformation that occurs as real GDP per head grows. Simulations are provided for all development processes within an income range from 1,000 to 12,000 dollars at 1990 prices (PPP), when most of the transition from a pre-industrial into a modern society occurs. A glance at Table 6 allow us to expand and qualify what has been said above about the regressions' output. Three development processes are considered, i.e., accumulation, resource allocation, and demographic transition. Together with the normal structural change associated to a rise in GDP per head, growth elasticities have been computed for given levels of income and for changes in the level of income (Table 7).

A major issue emerges from Table 6: most development processes were half-completed at early stages of development, somewhere in between 3,000 and 4,000 dollars, and four-fifths of the transformation had occurred by 8,000 dollars[25]. The implication is that growth in post-World War II Europe, the period from where most economic theorists derived their stylized facts, is weakly related to resource allocation[26].

In the accumulation process, proxies for physical and human capital have been considered. Information on expenditure components of GDP helped us to derive net imports of goods and services as a residual which, in turn, proximated capital net inflow, and, as a result, to estimate the rate of savings (as a share of GDP). The comparison between investment and saving suggests a life-cycle behaviour, in which domestic saving is lower than investment demand at initial levels of the transition, with the gap closing as income rises.

In both cases, the share of GDP increases as income rises, multiplying over the total income range considered by a ratio of 3.5 in the case of saving (2.4 times up to $4,000, the mid- transition point), and by 2.8 in the case of investment (2.0 up to $4,000), that is, representing a gain of 16.3 percentage

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25 Pro-memoria: A *per capita* income of $4,000 was reached by the U.K. in the 1890's, and by France in the mid-1920's; a level of $8,000 was reached by the UK or Germany in the late 1950's; and $12,000 was the income of France and Germany in the early 1970's (Table 2).

26 Such an empirical fact reinforced the neoclassical assumption that adjustments within the economy are immediate and frictionless.

TABLE 6

ALL COUNTRIES

NORMAL VARIATION IN ECONOMIC STRUCTURE WITH THE LEVEL OF DEVELOPMENT
-Predicted Values at Different Income Levels-
US 1990 $ PPP (G-K)

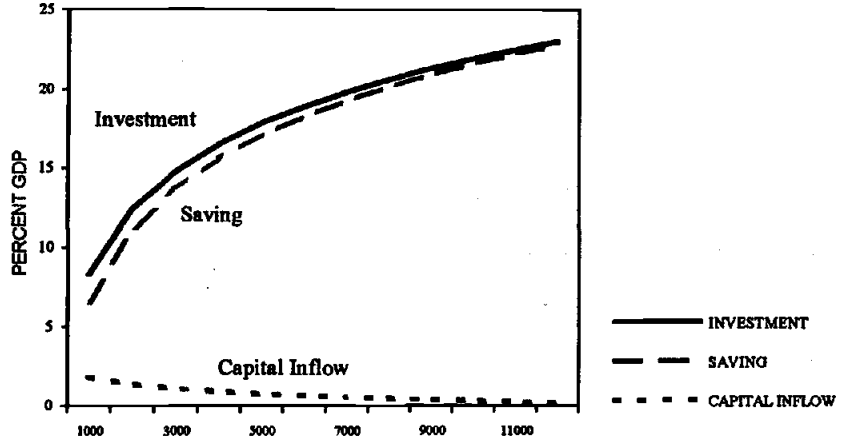
PROCESSES	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
ACCUMULATION												
Investment (% GDP)												
SAVING	6.5	11.0	13.7	15.6	17.1	18.3	19.3	20.2	21.0	21.6	22.3	22.8
INVESTMENT	8.3	12.4	14.8	16.5	17.8	18.9	19.8	20.6	21.3	21.9	22.5	23.0
CAPITAL INFLOW	1.8	1.4	1.1	0.9	0.7	0.6	0.5	0.4	0.3	0.3	0.2	0.2
Education (%)												
LITERACY	51.1	65.8	74.3	80.4	85.1	89.0	92.2	95.1	97.6	99.8	101.8	103.6
SCHOOLING	31.7	41.1	46.6	50.5	53.6	56.1	58.2	60.0	61.6	63.0	64.3	65.5
RESOURCE ALLOCATION												
Demand (% GDP)												
PRIVATE CONSUMPTION	87.7	80.1	75.7	72.5	70.0	68.0	66.3	64.9	63.6	62.4	61.4	60.4
GOVT. CONSUMPTION	5.8	8.8	10.6	11.9	12.9	13.7	14.4	14.9	15.5	15.9	16.3	16.7
Production (% GDP)												
AGRICULTURE	44.6	33.2	26.4	21.7	18.0	15.0	12.4	10.2	8.3	6.5	5.0	3.5
INDUSTRY	26.4	29.8	31.8	33.2	34.3	35.2	36.0	36.7	37.2	37.8	38.2	38.7
SERVICES	29.0	37.0	41.8	45.1	47.7	49.8	51.6	53.1	54.5	55.7	56.8	57.8
Labour Force (%)												
AGRICULTURE	65.7	50.1	41.0	34.6	29.5	25.5	22.0	19.0	16.4	14.0	11.9	9.9
INDUSTRY	21.1	25.9	28.7	30.6	32.2	33.4	34.5	35.4	36.2	36.9	37.6	38.2
SERVICES	13.2	24.0	30.3	34.8	38.3	41.1	43.5	45.6	47.4	49.1	50.5	51.9
Urbanization (%)												
URBAN POPULATION	12.6	22.6	28.5	32.7	35.9	38.5	40.8	42.7	44.4	45.9	47.3	48.6
Relative Labour Productivity (%)												
AGRICULTURE	68.0	66.2	64.5	62.7	60.9	58.8	56.4	53.7	50.5	46.5	41.6	35.3
Trade (% GDP)												
EXPORTS OF GOODS	11.6	15.4	17.6	19.1	20.3	21.4	22.2	22.9	23.6	24.1	24.6	25.1
PRIMARY EXPORTS	11.6	10.9	10.0	9.4	8.9	8.6	8.2	7.9	7.7	7.5	7.3	7.1
MANUFACTURED EXPORTS	0.0	4.5	7.6	9.7	11.4	12.8	14.0	15.0	15.9	16.6	17.3	18.0
IMPORTS OF GOODS	10.9	16.0	18.9	21.1	22.7	24.0	25.2	26.2	27.0	27.8	28.5	29.1
OPENNESS	20.5	31.4	36.5	40.2	43.0	45.4	47.4	49.1	50.6	51.9	53.1	54.2
DEMOGRAPHIC TRANSITION												
BIRTH RATE (o/oo)	33.2	27.7	24.5	22.2	20.4	19.0	17.7	16.7	15.7	14.9	14.1	13.5
DEATH RATE (o/oo)	22.2	18.6	16.4	14.9	13.7	12.8	11.9	11.2	10.6	10.0	9.5	9.1
RATE NATURAL INCREASE (o/oo)	11.0	9.1	8.1	7.3	6.7	6.2	5.8	5.5	5.1	4.9	4.6	4.4
FERTILITY	4.6	3.9	3.4	3.1	2.9	2.7	2.5	2.3	2.2	2.1	2.0	1.9
INFANT MORTALITY (o/oo)	186.8	136.8	107.5	86.7	70.6	57.4	46.3	36.6	28.1	20.5	13.6	7.3
NET FERTILITY [FERTILITY*[1-INFMORT/1000]]	3.8	3.3	3.0	2.8	2.6	2.5	2.4	2.2	2.1	2.0	2.0	1.9

NORMAL VARIATIONS IN ACCUMULATION PROCESSES

ALL COUNTRIES

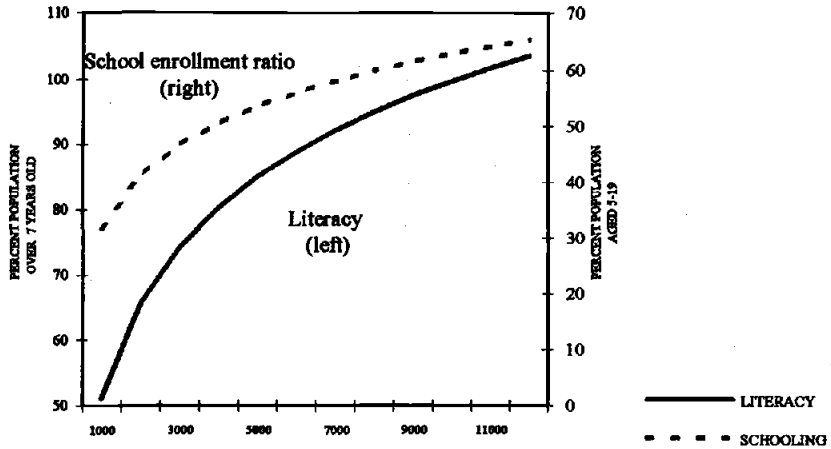
GRAPH 5

INVESTMENT



GRAPH 6

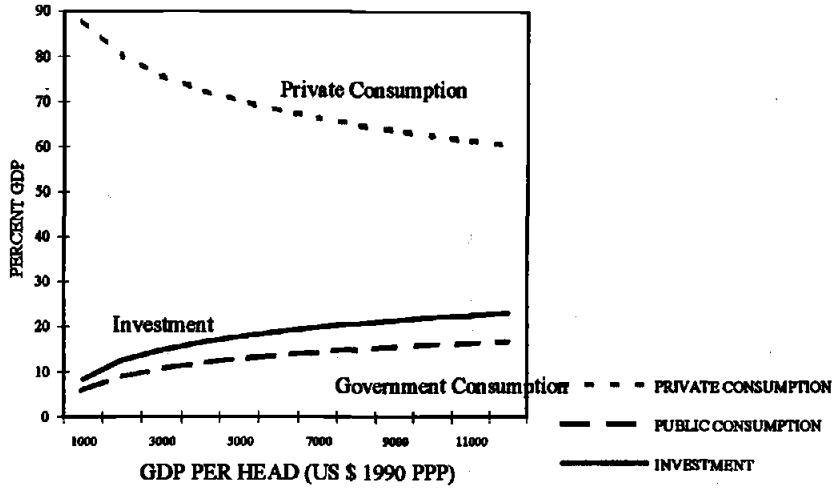
EDUCATION



NORMAL VARIATIONS IN RESOURCE ALLOCATION PROCESSES
ALL COUNTRIES

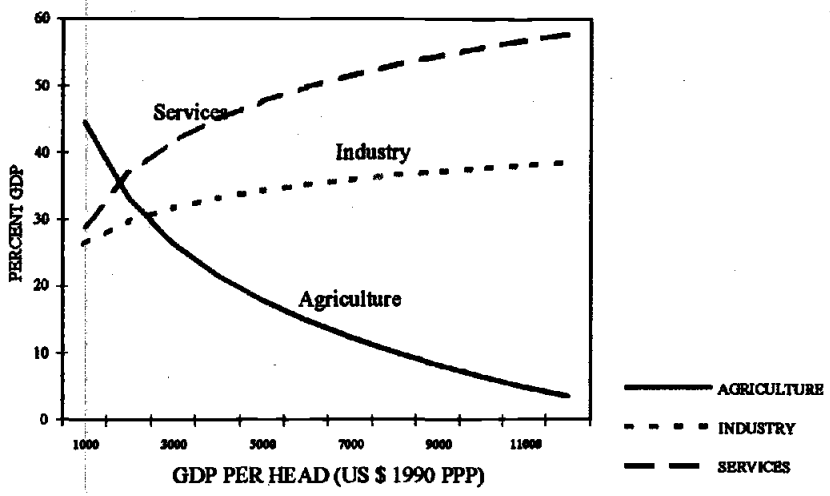
GRAPH 7

DEMAND



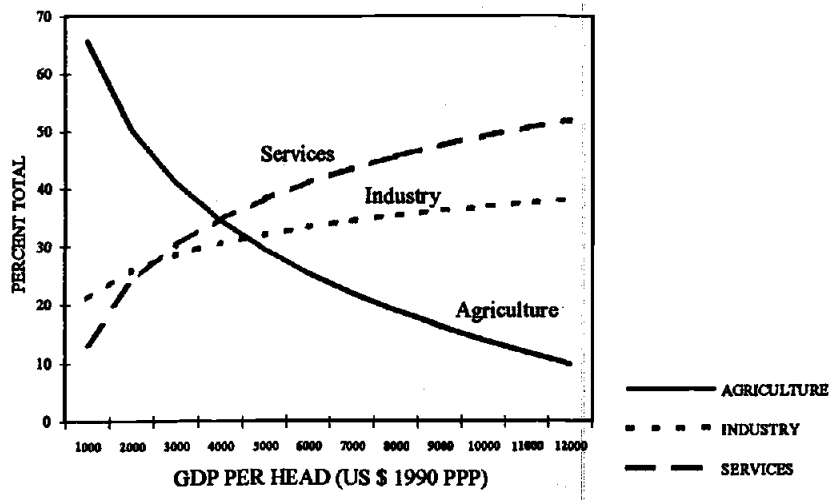
GRAPH 8

PRODUCTION



GRAPH 9

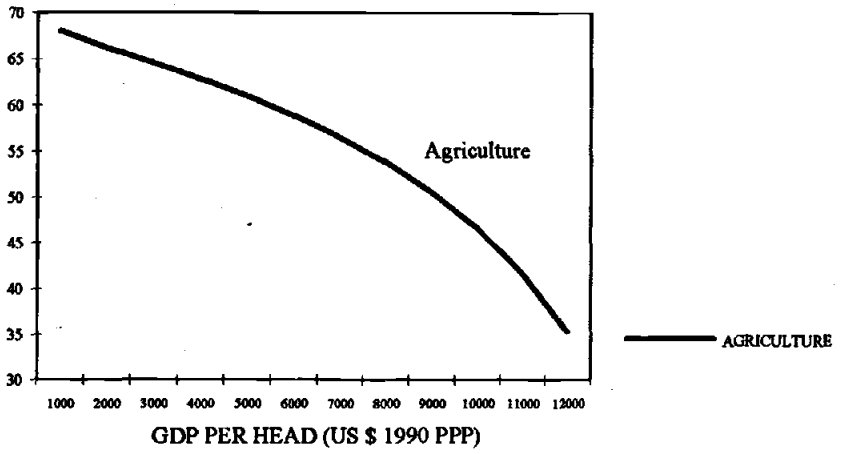
LABOUR



NORMAL VARIATIONS IN RESOURCE ALLOCATION PROCESSES
ALL COUNTRIES

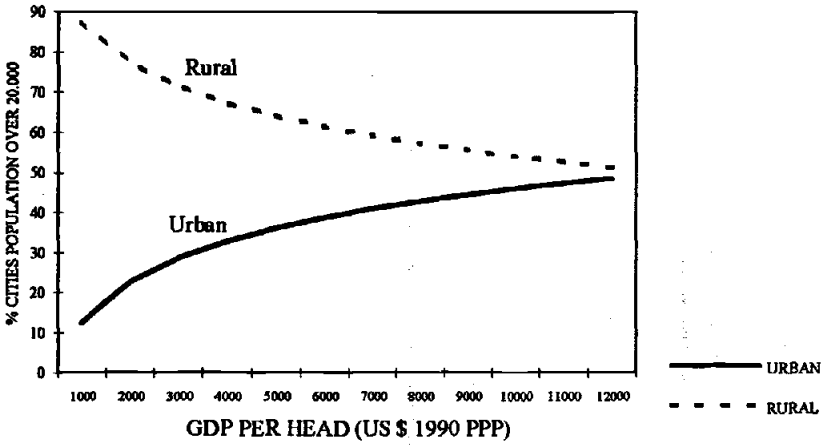
GRAPH 10

RELATIVE LABOUR PRODUCTIVITY (%)



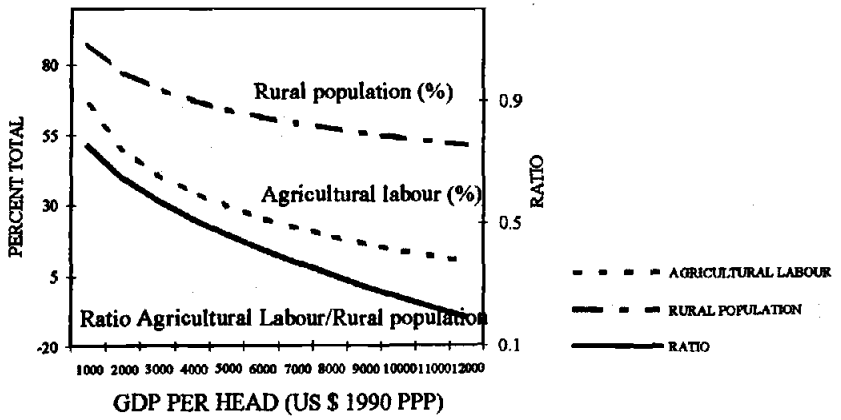
GRAPH 11

URBANIZATION



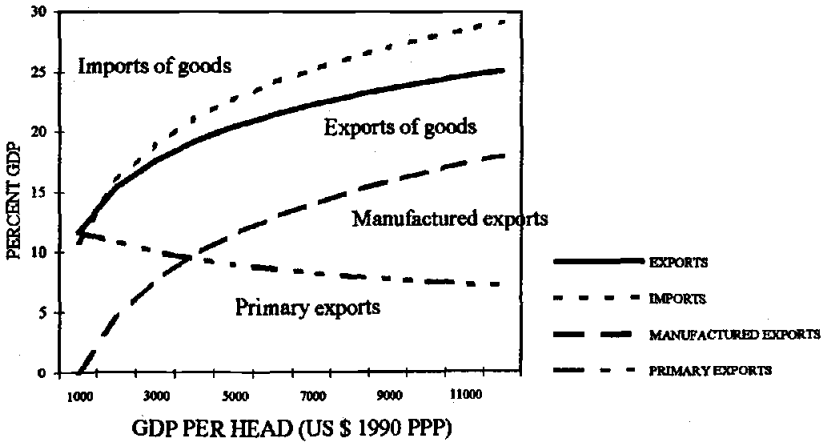
GRAPH 12

LABOUR FORCE IN AGRICULTURE OVER RURAL POPULATION



GRAPH 13

TRADE

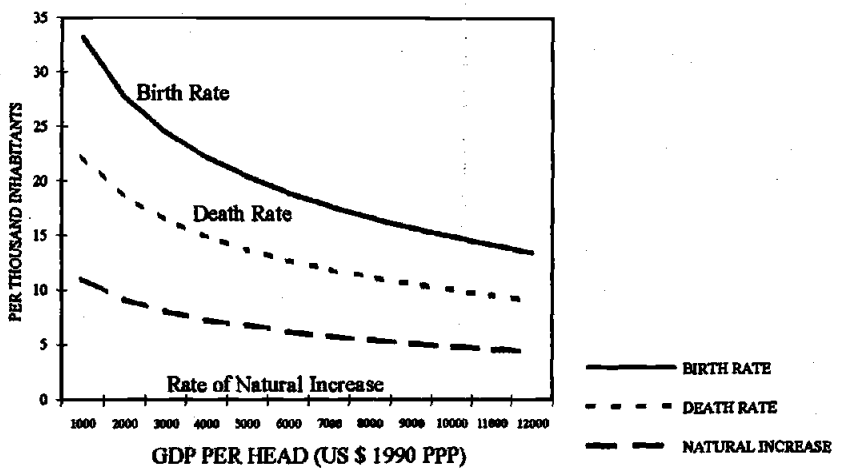


NORMAL VARIATIONS IN DEMOGRAPHIC TRANSITION PROCESSES

ALL COUNTRIES

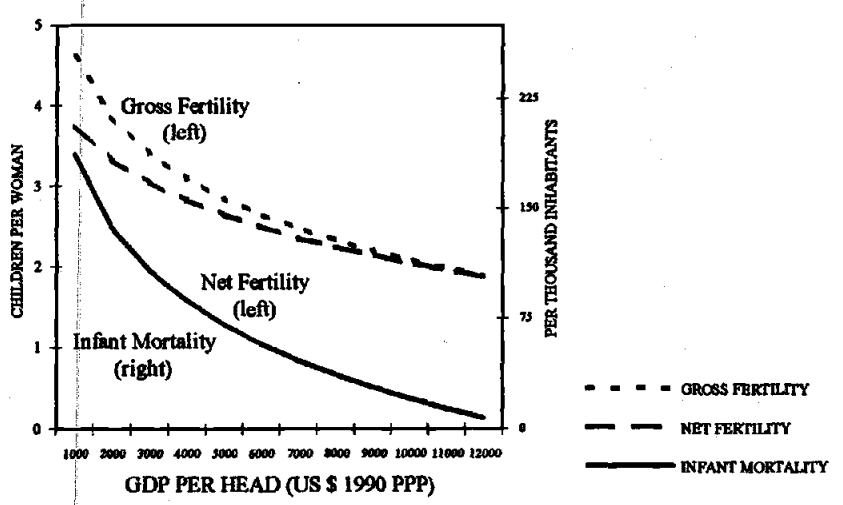
GRAPH 14

CRUDE BIRTH AND DEATH RATES



GRAPH 15

FERTILITY AND INFANT MORTALITY



points for saving, and 14.7 for investment (9.1 and 8.2 by $4,000, when over half the transition was completed). Proximate indices for human capital also show large increases, multiplying by 2 over the transition (1.6 by half of it), that is, up to 52.5 percentage points for literacy, and 33.8 for schooling, (29.3 and 18.8 up to $4,000).

Associated to growth, there are structural shifts in the allocation of resources, i.e., demand, trade and the use of productive factors change as income per head rises. Resource allocation interacts with factor endowment, economic policies and productivity growth to condition the path of industrialization. We can analyse demand and supply changes separately. Overall consumption fell by 20 per cent throughout the transition (10 per cent when half of it was achieved), that is, declining from over 90 per cent of aggregate demand to around three-fourths. Trends in private and government consumption followed, however, opposite directions, while the former fell by 31 per cent, the latter rose by 188 per cent (-17 and 105 per cent, respectively, over the first half of the transition). In percentage points, the variations represent 27.3 percentage points of decline for private and 10.9 of rise for public consumption (-15.2 and 6.1 by half the transition).

On the supply side, a decline occurs in agriculture's shares in output and employment, while, for industry and services, there is an increase. It is worth mentioning that absolute increases are more noticeably in the sectoral shares for services (28.8 and 38.7 percentage points gained for output and employment over the transition) than for industry (12.1 and 17.1, respectively), in particular, at higher income levels (over $4,000). Agriculture's supremacy in output disappears by $3,000, and in employment by $4,000. Interestingly enough, the proportional change implied by the transition differs from output to employment. It means that relative (average) labour productivity (i.e., the ratio of sectoral shares in output to those in employment) differs across sectors and, consequently, that sectoral efficiency improvements in the use of labour do not proceed at the same pace. In agriculture, a sharper decline can be noticed for output's share (-41.1 percentage points) than for employment's (-55.8) (where a relative and, then, an absolute decline is experienced), which explains why the productivity gap widens as income rises (Graph 10). Lagged shift of labour out of agriculture due to low mobility of workforce, as it is the case when surplus labour in agriculture exists, contributes to explaning the productivity gap. Besides, partial productivity differences appear in most industrialization

experiences as investment and technological change occur more often in modern industry and services[27]. Had all sectors the same production function, average labour productivity would equalise across them, provided the same factor prices and a complete resource mobility for all (Chenery (1988:256). Our data, however, do not allow us to say anything about differentials in marginal productivity. Sectoral information on skills and wages might help to make some conjectures. A caveat to be made about relative labour productivity derives from the weakness of statistical data for employment in agriculture. In fact, at lower income levels, when the division of labour is not widely diffused yet, figures for active population in agriculture (our main historical source for employment) tend to be over-exaggerated, as part-time labourers in industry and services tend to register under their main professions, e.g., farmers; conversely, figures for industry and services are usually understated[28].

Population share in towns over 20,000 inhabitants is the arbitrary threshold used here to consider the degree of urbanization. A rapid increase in urbanization takes place as income rises (Graph 11). A multiplier of 3.9 applies for the entire transition (2.6 for half of it), representing a 36 percentage point rise (20 up to $4,000). Besides, a decline in the proportion of agricultural labour within rural population occurs as GDP per head improves, suggesting that people living in the countryside tends to work increasingly outside agriculture as economic growth proceeds (from three quarters to one-fifth over the transition) (Graph 12).

Development patterns for international trade help us to search for the sources of a country's comparative advantage and its changes as income grows (Graph 13). Historically, natural resource endowments, factor proportions, and economic policies have conditioned trade specialisation. In our examination of trade patterns, we firstly, notice a close link between the rise in GDP per head and that in trade ratios to GDP (33.7 percentage point gain for openness, that is, exports plus imports), though the gain for imports exceeds that for exports. A possible explanation for the latter would be that as income grows, a commodity trade deficit appears, that has to be balanced either by a surplus in services trade (as in 19th Century Britain (Imlah (1958)) or by an inflow of capital (mid-19th century Spain (Prados (1988)). Changes in comparative advantage from primary production into manufacturing are revealed by the

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27 Cf. Chenery & Syrquin (1975), p.48. As an example, cf. Crafts (1985) for the British case.

28 Cf. O'Brien & Prados de la Escosura (1992).

composition of exports as income grows. Manufactured exports overcome those of primary goods around $4,000 of income. Meanwhile, industry's share in GDP becomes larger than agriculture's at $3,000. To interpret such a lag one may think in terms of a Linder (1961) scenario for Europe, in which the home market for industrial goods would be a previous step to manufacturing exports.

Finally, the demographic transition suggests a decline in both natality and mortality, in which the former experienced a deeper absolute fall, with the result of a slowing down in the rate of natural increase (by 6.6 percentage points), as income per head improves (Graph 14). Meanwhile, a decline in gross fertility is softened in net terms by the more rapid reduction in infant mortality (Graph 15).

So far only tendencies have been pointed out. Table 7 provides a more precise measurement of the responsiveness of structural transformation to changes in GDP per head for each development process. Elasticities have been computed both at a given level of income (point estimates) and for income changes (discrete estimates), covering most of the transition from a pre-industrial into a modern economy. It appears that, in both estimates, the lower the income level, the higher the value of the coefficient for growth elasticity, with the exception of those cases in which a negative relationship exists, where just the opposite occurs. Differences in the structural response to increases in income are worth noticing. Both measures of elasticities are higher, at low income levels, for investment and government consumption, the share of services in total employment and urbanization and manufactured exports, while private consumption, industrial shares in output and employment, fertility (gross and net), infant mortality and crude birth and death rates, appear at the lower end.

Up to now, the discussion has dealt with a set of common patterns for Europe. However, when such a large time span is being considered, one should expect distinctive structural behaviour in different historical periods. Our adjusted patterns of development try to account for historical differences in performance and, as a result, sub-patterns were constructed for Europe before World War I. The same method used for the construction of overall patterns was followed. Table 8 presents the patterns, while growth elasticities appear in

TABLE 7

ALL COUNTRIES

NORMAL VARIATION IN GROWTH ELASTICITIES WITH THE LEVEL OF DEVELOPMENT

-Predicted Values at Different Income Levels-

US 1990 $ PPP (G-K)

PROCESSES	Point Elasticities*				Discrete Elasticities**	
	1000	2000	4000	8000	1000-4000	4000-8000
ACCUMULATION						
Investment (% GDP)						
SAVING					0.632	0.373
INVESTMENT	0.71	0.48	0.36	0.29	0.496	0.320
CAPITAL INFLOW						
Education (%)						
LITERACY	0.41	0.32	0.26	0.22	0.327	0.242
SCHOOLING	0.43	0.33	0.27	0.23	0.336	0.249
RESOURCE ALLOCATION						
Demand (% GDP)						
PRIVATE CONSUMPTION	-0.13	-0.14	-0.15	-0.17	-0.137	-0.160
GOVT. CONSUMPTION	0.80	0.50	0.37	0.30	0.518	0.324
Production (% GDP)						
AGRICULTURE	-0.37	-0.50	-0.76	-01.62	-0.520	-1.089
INDUSTRY	0.23	0.20	0.18	0.16	0.165	0.145
SERVICES	0.40	0.31	0.26	0.22	0.319	0.236
Labour Force (%)						
AGRICULTURE	-0.34	-0.45	-0.65	-1.18	-0.463	-0.840
INDUSTRY	0.33	0.27	0.23	0.20	0.268	0.210
SERVICES	1.18	0.65	0.45	0.34	0.699	0.390
Urbanization (%)						
URBAN POPULATION	1.15	0.64	0.44	0.34	0.688	0.385
Trade (% GDP)						
EXPORTS OF GOODS	0.47	0.35	0.28	0.24	0.361	0.262
PRIMARY EXPORTS	-	-	-	-	-0.152	-0.251
MANUFACTURED EXPORTS	-	1.67	0.78	0.50	1.639	0.629
IMPORTS OF GOODS	0.55	0.38	0.28	0.23	0.477	0.312
OPENNESS	0.62	0.41	0.32	0.26	0.486	0.289
DEMOGRAPHIC TRANSITION						
BIRTH RATE (o/oo)	-0.24	-0.29	-0.36	-0.48	-0.290	-0.411
DEATH RATE (o/oo)	-0.24	-0.28	-0.36	-0.47	-0.288	-0.412
FERTILITY	-0.24	-0.28	-0.35	-0.48	-0.285	-0.431
INFANT MORTALITY (o/oo)	-0.39	-0.53	-0.83	-1.97	-0.554	-1.244
NET FERTILITY [FERTILITY*[1-INFMORT/1000]]	-0.20	-0.23	-0.27	-0.34	-0.220	-0.348

* Computed as $\varepsilon_{x_t,y_t} = \frac{\alpha_1 + 2\alpha_2 \ln Y_t}{x_t}$, where α_1 and α_2 are the coefficients for lineal and quadratic terms of income (Y_t) in the regresssion, and x_t is the predicted value corresponding to the level of income at which the elasticity is being computed.

** Elasticities with respect to GDP per head computed from Table 6 by dividing log differences: $\left[\text{Ln}(X_T / X_0) / \text{Ln}(Y_T / Y_0)\right]$.

Table 9. For the sake of simplicity, only the $1,000- $4,000 income range has been considered. (In fact, most European countries had not reached the upper level by 1913).

Some interesting findings can be reported from the comparison between Pre-World War I patterns of development, and the average patterns for 19th and 20th centuries for Europe discussed so far (Table 6-9). As shown in Table 8, accumulation in both human and physical capital proceeded at a different pace before the Great War; it was larger at low income levels and smaller at high ones, i.e., pre-1914 investment was higher below $2,000, while for literacy and schooling thar occurred below $3,000. Differences can also be observed for resource allocation. Thus, the composition of expenditure points to a higher (overall) consumption over $2,000, with the share of private consumption larger over $1,000 and that of government consumption smaller at any income level. The supply side shows noticeable differences for the pre-1914 patterns. In agriculture, a larger size of GDP for any income level, and a smaller labour force over $1,000, result in a lower productivity gap for Europe before the Great War, that tends to close as income rises. Lower shares of industry and services (the latter up to $3,000) in GDP and higher shares in employment (over $1,000 in the case of industry) complete a more balanced labour allocation for the early starters. Besides, a more urbanized society exists over $2,000 in the pre-World War I patterns. Differences in international trade also appear between pre-World War I and the average patterns of development, i.e., the former exhibits a more open economy over $1,000 in which comparative advantage lies in manufactures. Higher birth and death rates, and lower population pressure below $4,000, plus higher fertility and infant mortality, are the main demographic differences for pre-1914 Europe.

Comparing growth elasticities for each structural variable at given income levels, or as income increases for different historical phases, is most illuminating. Values (in absolute terms) for both measures of elasticity are shown in Table 9. The comparison of elasticities for pre-World War I and average patterns of development points out that their values in the case of the former are larger for literacy, schooling, urbanization, agriculture and industrial shares in labour force and trade (in most cases).

TABLE 8

ALL COUNTRIES: PRE-WORLD WAR I

NORMAL VARIATION IN ECONOMIC STRUCTURE WITH THE LEVEL OF DEVELOPMENT

-Predicted Values at Different Income Levels-

US 1990 $ PPP (G-K)

PROCESSES	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	4000
ACCUMULATION												
Investment (% GDP)												
SAVING												
INVESTMENT	8.8	9.5	10.1	10.6	11.1	11.4	11.8	12.1	12.4	12.6	12.9	13.3
CAPITAL INFLOW												
Education (%)												
LITERACY	33.7	43.1	50.7	57.2	62.8	67.7	72.2	76.2	79.8	83.2	86.3	91.9
SCHOOLING	28.2	31.9	34.9	37.4	39.6	41.6	43.3	44.9	46.3	47.6	48.8	51.0
RESOURCE ALLOCATION												
Demand (% GDP)												
PRIVATE CONSUMPTION	84.7	83.8	83.1	82.5	82.0	81.6	81.2	80.8	80.5	80.2	79.9	79.4
GOVT. CONSUMPTION	6.2	6.4	6.6	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.6
Production (% GDP)												
AGRICULTURE	47.9	43.9	40.5	37.7	35.3	33.1	31.2	29.5	27.9	26.4	25.1	22.7
INDUSTRY	25.5	26.4	27.2	27.8	28.3	28.9	29.3	29.7	30.0	30.4	30.7	31.2
SERVICES	26.6	29.7	32.3	34.5	36.4	38.0	39.5	40.8	42.1	43.2	44.2	46.1
Labour Force (%)												
AGRICULTURE	67.6	61.5	56.4	52.2	48.5	45.2	42.3	39.7	37.3	35.1	33.0	29.3
INDUSTRY	17.4	20.2	22.6	24.5	26.2	27.7	29.0	30.2	31.3	32.3	33.3	35.0
SERVICES	15.0	18.3	21.0	23.3	25.3	27.1	28.7	30.1	31.4	32.6	33.7	35.7
Urbanization (%)												
URBAN POPULATION	7.7	12.5	16.4	19.8	22.7	25.3	27.6	29.6	31.5	33.3	34.9	37.8
Relative Labour Productivity (%)												
AGRICULTURE	70.8	71.3	71.8	72.3	72.8	73.3	73.8	74.3	74.8	75.4	76.0	77.2
Trade (% GDP)												
EXPORTS OF GOODS	9.8	12.5	14.7	16.6	18.3	19.7	21.0	22.2	23.3	24.3	25.2	26.8
PRIMARY EXPORTS	9.8	11.1	11.5	11.8	12.1	12.3	12.5	12.7	13.0	13.1	13.3	13.5
MANUFACTURED EXPORTS	0.0	1.4	3.2	4.8	6.2	7.4	8.5	9.5	10.3	11.2	11.9	13.3
IMPORTS OF GOODS	6.8	9.9	12.5	14.6	16.4	18.1	19.6	20.9	22.1	23.2	24.2	26.1
OPENNESS	16.6	22.4	27.2	31.2	34.7	37.8	40.6	43.1	45.4	47.5	49.4	52.9
DEMOGRAPHIC TRANSITION												
BIRTH RATE (o/oo)	34.6	33.3	32.1	31.2	30.4	29.6	29.0	28.4	27.8	27.3	26.9	26.1
DEATH RATE (o/oo)	24.1	23.3	22.6	22.0	21.5	21.0	20.6	20.3	19.9	19.6	19.3	18.8
RATE NATURAL INCREASE (o/oo)	10.5	10.0	9.5	9.2	8.9	8.6	8.4	8.1	7.9	7.7	7.6	7.3
FERTILITY	4.7	4.6	4.5	4.4	4.3	4.2	4.2	4.1	4.1	4.0	4.0	3.9
INFANT MORTALITY (o/oo)	194.8	183.4	174.0	166.2	159.3	153.3	147.9	143.0	138.5	134.4	130.6	123.9
NET FERTILITY [FERTILITY*[1-INFMORT/1000]]	3.8	3.7	3.7	3.7	3.6	3.6	3.6	3.5	3.5	3.5	3.5	3.4

TABLE 9

ALL COUNTRIES: PRE-WORLD WAR I

NORMAL VARIATION IN GROWTH ELASTICITIES WITH THE LEVEL OF DEVELOPMENT
-Predicted Values at Different Income Levels-
US 1990 $ PPP (G-K)

PROCESSES	Point Elasticities*			Discrete Elasticities **
	1000	2000	4000	1000-4000
ACCUMULATION				
Investment (% GDP)				
SAVING				-
INVESTMENT	0.37	0.29	0.24	0.298
CAPITAL INFLOW				
Education (%)				
LITERACY	1.24	0.67	0.46	0.724
SCHOOLING	0.58	0.41	0.32	0.427
RESOURCE ALLOCATION				
Demand (% GDP)				
PRIVATE CONSUMPTION	-0.05	-0.05	-0.05	-0.047
GOVT. CONSUMPTION	0.17	0.15	0.14	0.147
Production (% GDP)				
AGRICULTURE	-0.38	-0.52	-0.80	-0.539
INDUSTRY	0.18	0.16	0.15	0.146
SERVICES	0.53	0.39	0.31	0.397
Labour Force (%)				
AGRICULTURE	-0.41	-0.57	-0.94	-0.603
INDUSTRY	0.72	0.48	0.36	0.504
SERVICES	1.00	0.59	0.42	0.626
Urbanization (%)				
URBAN POPULATION	2.82	0.96	0.57	1.148
Trade (% GDP)				
EXPORTS OF GOODS	1.25	0.67	0.46	0.726
PRIMARY EXPORTS	-	-	-	0.231
MANUFACTURED EXPORTS	-	1.64	0.77	1.866
IMPORTS OF GOODS	2.31	0.96	0.60	0.970
OPENNESS	1.58	0.76	0.50	0.836
DEMOGRAPHIC TRANSITION				
BIRTH RATE (o/oo)	-0.18	-0.20	-0.24	-0.203
DEATH RATE (o/oo)	-0.16	-0.18	-0.20	-0.179
FERTILITY	-0.12	-0.14	-0.15	-0.135
INFANT MORTALITY (o/oo)	-0.96	-0.32	-0.41	-0.326
NET FERTILITY [FERTILITY*[1-INFMORT/1000]]	-0.09	-0.09	-0.10	-0.080

* Computed as $\varepsilon_{x_t,y_t} = \frac{\alpha_1 + 2\alpha_2 \ln Y_t}{x_t}$, where α_1 and α_2 are the coefficients for lineal and quadratic terms of income (Y_t) in the regresssion, and x_t is the predicted value corresponding to the level of income at which the elasticity is being computed.

** Elasticities with respect to GDP per head computed from Table 8 by dividing log differences:
$\left[\text{Ln}(X_T / X_0) / \text{Ln}(Y_T / Y_0)\right]$.

IV. Alternative Patterns of Development: Core and Periphery.

In his pathbreaking assessment of economic retardation in European history, Gerschenkron (1962) stressed that backward countries, by the simple fact of their late start, would follow a different path of development with respect to advanced nations. Divergences would stem from the structure of production, that results, in turn, from different institutions that substituted for the missing pre-requisites of the first wave of industrialization. Chenery followed this way of reasoning:

> "late comers are different.. [the difference] stems from the existence of the advanced countries as a source of technology, capital and manufactured imports, as well as markets for exports"[29].

As Gerschenkron before, Crafts (1984:449)) perceived, in 19th century Europe, "tendencies towards a different kind of structural change in the later developing countries". One must be cautious, however, in the search for different patterns of development, either for distinctive periods or for groups of countries, since the search for uniform features leads to a further division of countries into more homogeneous clubs which, in the end, might only represent alternative development strategies[30]. Therefore, we will only attempt to draw a distinction between early starters and late comers to industrialization. Early and late starters are, in historical literature, synonimous terms of Core and Periphery in development economics terminology, but the empirical use of these concepts presents obvious difficulties, i.e., a country could have an early start but to stagnate later, and ending up as a part of the Periphery. From a practical point of view, adding and dropping countries as they perform over or below the average appears confusing and lacking of a clear meaning. Instead, we decided to use Britain, the European leader up to the Post-World War II years, as a yardstick, and those countries that, by 1950, had never reached a level of *per capita* income similar to that of 1913 UK, were considered as part of Periphery[31]. Arbitrary as it is, the definition allows us to distinguish between different patterns of behaviour in two different clubs, Core and Periphery.

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29 Chenery (1975), p. 458.
30 Cf. Chenery (1988), p:60.
31 See footnote 11.

IV.1. Econometric Results.

Patterns of development for Core and Periphery have been estimated through an econometric procedure identical to the one applied for the entire pool of countries, and only a few comments are dedicated to the econometric results for both single and adjusted patterns, that are presented in Appendix D.

For the demand, estimated coefficients of income and population present the expected sign, as income is negatively, and population is (mostly) positively, related to consumption (both total and private) and, conversely, for the case of domestic investment (with the exception of the Core, where a negative correlation appears for income in the adjusted pattern). Size and trend dummies correlate positively to investment (mostly) and public consumption, and negatively to private consumption. The adjusted patterns allow us to point out that, in the case of private consumption, the estimated coefficient of income reached a lower absolute value in the pre-World War I period, for both Core and Periphery.

Human capital indicators (school enrollment and literacy) show correlations positive to income and negative to population and size. A positive relation with time exists, while, in the case of schooling, the estimated coefficient for income was higher prior World War II. Urbanization, in turn, is positively related to income and population, and negatively to the country's size, with time being positively biased for the Periphery.

On the supply side, expected negative and positive correlations between income and population, on the one hand, and agricultural shares in output and employment, on the other, are not always confirmed by the signs of the estimated coefficients[32]. For industry, estimated coefficients for income are mostly positive. Positive time trends appear for the Core while the opposite happens to the Periphery. Size has always a positive relation to agriculture's shares in employment and output. Both time and size are negatively related to industry.

---

32 In the Core, the estimated coefficients for income are positive for the adjusted pattern, while, in all cases, are negative for population. While in the Periphery, only a negative correlation to income for the share of agriculture in total employment appears in the single pattern.

Foreign trade indicators show mostly a positive relation to income (with important exceptions for the Core), and, for population, a positive one for the Core and negative for the Periphery (allowing us to suggests that a Linder's scenario was a more probable feature in the former's development process). Time is positively correlated (except for manufactured exports), and size, negatively, to international trade.

Lastly, the demographic indicators tend to support the view of a negative correlation to income and time. The positive relation between income and fertility in the Periphery confirms our earlier suggestion that no simple extrapolation from contemporary stylized facts can be made for the past, since a growing income would lead to a fall in mortality (particularly among infants) and, therefore, an increase in fertility.

IV.2. Normal Structural Variacion with the Level of Development.

Some interesting results can be derived by comparing normal variations in development processes for Core and Periphery. Tables 10-11 and Graphs 16-30 summarize them. Some major findings can be briefly presented here.

In the accumulation process, the comparison between Core and Periphery casts some light on the different behaviour of late-comers. Despite the fact that, at low income levels, Core countries exhibit a higher rate of human and physical capital formation, such an advantage dissappears as income rises, and Peripheral countries reach higher investment (over $2,000), school enrollment ($4,000), and literacy ($9,000) rates. The life-cycle pattern of investment and saving suggested above is clearer for the Core, with domestic saving lower than investment demand up to $8,000, when the relationship reverses.

Structural shifts in the allocation of resources as GDP per head increases lead to some differences between Core and Periphery. On the demand side, the Core's total consumption remains higher (over $2,000), with government consumption catching up with the Periphery's at high income levels (over $11,000). On the supply side, the Core exhibits a smaller agriculture and larger industry and services, both in terms of output and employment. The changes implied by the transition differ from output to employment both in Core and Periphery, e.g., industry becomes larger than agriculture in terms of output and

employment as *per capita* income rises, but they take place at lower income levels for the early starters[33]. As a consequence, relative labour productivity differs across sectors and between Core and Periphery. Agricultural productivity declines relative to the economy's average as income rises in all cases, but is larger in the Periphery, and the differential gap widens as income rises. The high dependence on agriculture in Peripheral countries at given income levels is confirmed by the fact that, below $7,000, the Core was more urbanized and had a smaller proportion of its rural population involved in agricultural activities. The lagged shift of labour out of agriculture in the Periphery confirms Gerschenkron's (1962) assessment of the primary sector's lesser contribution to economic growth among late-comers.

Trade patterns, in turn, allow us to notice, at given income levels, a higher degree of openness in the Core (exports are larger, but not imports below $6,000). A larger (commodity) trade deficit appears for the Periphery suggesting that, as income grows, an inflow of capital (larger in relative terms) from abroad took place in the Periphery. Shifts in comparative advantage from primary production into manufaturing can be ascertained from the composition of exports. As income grows, manufactured exports becomes dominant (e.g., at $4,000 in the Core, and at $5,000 in the Periphery). When this development process is compared to the similar process in production, which is completed at much earlier stage of development (particularly for the Core), the conclusion seems to be that, for the early starters (but not so much for the late comers) a home market for manufactures emerges prior a foreign market (at least, of significant size), at earlier stages of development. In the Periphery, both the domestic and the external markets seem to emerge simultaneously.

Finally, the demographic transition proceeds at a faster pace in the Periphery (as the time trend in the equations suggested), with a more rapid decline for mortality. The result is that its rate of natural increase overcomes that of the Core at $5,000. Net fertility, in turn, is higher in the Core up to that level of income (gross fertility up to $8,000 because of a higher infant mortality). At higher income levels, population pressure is stronger in the Periphery.

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33 Thus, in the Core, industrial output overcomes agriculture's at $2,000 (in the Periphery, at $4,000), while in terms of employment, at $4,000 (in the Periphery, at $6,000).

TABLE 10

CORE

NORMAL VARIATION IN ECONOMIC STRUCTURE WITH THE LEVEL OF DEVELOPMENT
-Predicted Values at Different Income Levels-
US 1990 $ PPP (G-K)

PROCESSES	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
ACCUMULATION												
Investment (% GDP)												
SAVING	5.2	9.8	12.4	14.3	15.8	17.0	18.0	18.8	19.6	20.3	20.9	21.5
INVESTMENT	6.4	10.6	13.0	14.7	16.1	17.2	18.1	18.9	19.6	20.2	20.8	21.3
CAPITAL INFLOW	1.2	0.8	0.6	0.4	0.3	0.2	0.1	0.1	0.0	-0.1	-0.1	-0.2
Education (%)												
LITERACY	75.8	83.2	87.6	90.7	93.1	95.0	96.7	98.1	99.4	100.5	101.5	102.5
SCHOOLING	36.8	44.1	48.4	51.4	53.8	55.7	57.3	58.7	59.9	61.0	62.0	63.0
RESOURCE ALLOCATION												
Demand (% GDP)												
PRIVATE CONSUMPTION	92.4	83.8	78.8	75.2	72.4	70.1	68.2	66.5	65.1	63.8	62.6	61.5
GOVT. CONSUMPTION	2.4	6.4	8.4	10.5	11.8	12.9	13.8	14.6	15.3	15.9	16.5	17.0
Production (% GDP)												
AGRICULTURE	41.1	30.5	24.3	20.0	16.6	13.8	11.4	9.4	7.6	6.0	4.6	3.2
INDUSTRY	32.4	33.7	34.5	35.0	35.4	35.8	36.1	36.3	36.5	36.7	36.9	37.1
SERVICES	26.5	35.8	41.2	45.0	48.0	50.4	52.5	54.3	55.8	57.3	58.5	59.7
Labour Force (%)												
AGRICULTURE	55.2	42.1	34.4	29.0	24.8	21.3	18.4	15.9	13.6	11.6	9.9	8.2
INDUSTRY	29.5	32.1	33.6	34.7	35.5	36.2	36.8	37.2	37.7	38.1	38.4	38.8
SERVICES	15.3	25.8	32.0	36.3	39.7	42.5	44.8	46.9	48.7	50.3	51.7	53.0
Urbanization (%)												
URBAN POPULATION	19.0	26.4	30.7	33.8	36.2	38.1	39.8	41.2	42.4	43.6	44.6	45.5
Relative Labour Productivity (%)												
AGRICULTURE	74.3	72.4	70.7	68.8	66.9	64.7	62.2	59.3	55.8	51.6	46.3	39.5
Trade (% GDP)												
EXPORTS OF GOODS	14.2	17.7	19.7	21.2	22.3	23.2	24.0	24.6	25.3	25.8	26.3	26.7
PRIMARY EXPORTS	12.5	11.1	10.2	9.7	9.2	8.8	8.5	8.2	8.0	7.8	7.6	7.4
MANUFACTURED EXPORTS	1.7	6.6	9.5	11.5	13.1	14.4	15.5	16.4	17.3	18.0	18.7	19.3
IMPORTS OF GOODS	14.6	18.6	20.9	22.5	23.8	24.9	25.8	26.5	27.2	27.8	28.3	28.9
OPENNESS	28.8	36.3	40.6	43.7	46.1	48.1	49.8	51.1	52.5	53.6	54.6	55.6
DEMOGRAPHIC TRANSITION												
BIRTH RATE (o/oo)	33.6	28.1	24.9	22.6	20.8	19.4	18.1	17.1	16.2	15.3	14.6	13.9
DEATH RATE (o/oo)	21.9	18.6	16.6	15.2	14.1	13.2	12.5	11.8	11.3	10.7	10.3	9.9
RATE NATURAL INCREASE (o/oo)	11.7	9.5	8.3	7.4	6.7	6.2	5.7	5.3	4.9	4.6	4.3	4.0
FERTILITY	4.7	3.9	3.4	3.1	2.9	2.7	2.5	2.3	2.2	2.1	2.0	1.9
INFANT MORTALITY (o/oo)	194.0	143.4	113.8	92.7	76.4	63.1	51.9	42.1	33.5	25.8	18.8	12.5
NET FERTILITY [FERTILITY*[1-INFMORT/1000]]	3.8	3.3	3.0	2.8	2.6	2.5	2.4	2.2	2.1	2.0	1.9	1.9

TABLE 11

PERIPHERY

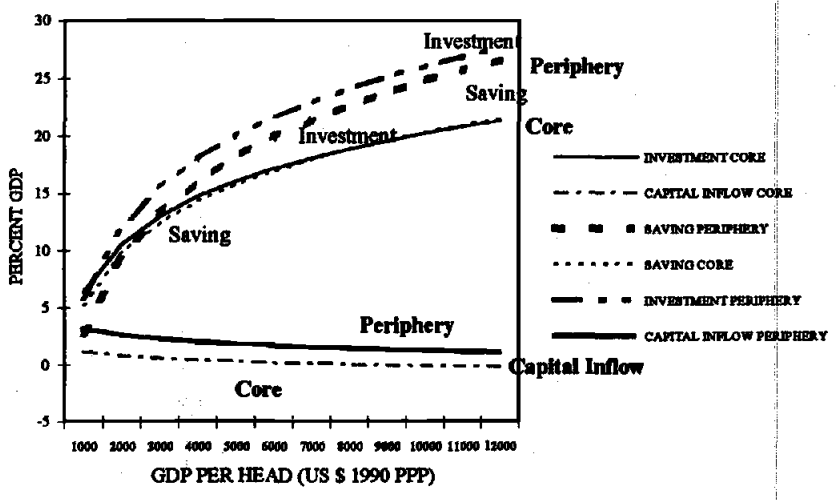
NORMAL VARIATION IN ECONOMIC STRUCTURE WITH THE LEVEL OF DEVELOPMENT
-Predicted Values at Different Income Levels-
US 1990 $ PPP (G-K)

PROCESSES	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
ACCUMULATION												
Investment (% GDP)												
SAVING	2.7	9.4	13.2	16.0	18.1	19.9	21.3	22.6	23.8	24.8	25.7	26.5
INVESTMENT	5.9	12.0	15.5	18.0	20.0	21.6	22.9	24.1	25.1	26.1	26.9	27.6
CAPITAL INFLOW	3.2	2.6	2.3	2.0	1.9	1.7	1.6	1.5	1.3	1.3	1.2	1.1
Education (%)												
LITERACY	43.6	61.3	71.6	79.0	84.7	89.3	93.3	96.7	99.7	102.4	104.8	107.1
SCHOOLING	24.5	38.0	46.0	51.6	55.9	59.5	62.5	65.1	67.4	69.5	71.4	73.1
RESOURCE ALLOCATION												
Demand (% GDP)												
PRIVATE CONSUMPTION	88.6	79.7	74.5	70.8	67.9	65.6	63.6	61.9	60.3	59.0	57.8	56.6
GOVT. CONSUMPTION	8.6	10.9	12.2	13.2	14.0	14.5	15.0	15.5	15.9	16.2	16.5	16.8
Production (% GDP)												
AGRICULTURE	51.2	37.6	29.7	24.1	19.7	16.2	13.1	10.6	8.2	6.2	4.3	2.6
INDUSTRY	16.1	23.1	27.2	30.1	32.3	34.1	35.7	37.0	38.2	39.3	40.2	41.1
SERVICES	32.7	39.3	43.1	45.8	48.0	49.7	51.2	52.4	53.6	54.5	55.5	56.7
Labour Force (%)												
AGRICULTURE	70.4	54.8	45.7	39.3	34.2	30.2	26.7	23.7	21.6	18.7	16.6	14.6
INDUSTRY	16.1	21.7	25.0	27.3	29.2	30.6	31.9	33.0	33.9	34.8	35.6	36.3
SERVICES	13.5	23.5	29.3	33.4	36.6	39.2	41.4	43.3	45.0	46.5	47.8	49.1
Urbanization (%)												
URBAN POPULATION	8.7	19.8	26.3	31.0	34.5	37.5	39.9	42.1	44.0	45.6	47.2	48.6
Relative Labour Productivity (%)												
AGRICULTURE	72.7	68.6	65.0	61.3	57.6	53.6	49.2	44.4	39.1	33.0	26.1	17.9
Trade (% GDP)												
EXPORTS OF GOODS	7.7	11.8	14.2	15.9	17.2	18.3	19.2	20.0	20.7	21.3	21.9	22.4
PRIMARY EXPORTS	(7.7)	10.6	9.3	8.4	7.7	7.2	6.7	6.3	5.9	5.6	5.3	5.0
MANUFACTURED EXPORTS	(0.0)	1.2	4.9	7.5	9.5	11.1	12.5	13.7	14.8	15.7	16.6	17.4
IMPORTS OF GOODS	17.7	20.1	21.9	23.1	24.1	24.9	25.6	26.1	26.7	27.1	27.5	27.9
OPENNESS	24.7	31.9	36.1	39.0	41.3	43.2	44.8	46.1	47.4	48.4	49.4	50.3
DEMOGRAPHIC TRANSITION												
BIRTH RATE (o/oo)	34.4	28.3	24.7	22.2	20.2	18.6	17.3	16.1	15.0	14.1	13.3	12.5
DEATH RATE (o/oo)	24.1	19.4	16.7	14.8	13.3	12.0	11.0	10.1	9.3	8.6	8.0	7.4
RATE NATURAL INCREASE (o/oo)	10.3	8.9	8.0	7.4	6.9	6.6	6.3	6.0	5.7	5.5	5.3	5.1
FERTILITY	4.3	3.6	3.2	3.0	2.7	2.6	2.4	2.3	2.2	2.1	2.0	1.9
INFANT MORTALITY (o/oo)	184.6	132.3	101.7	80.0	63.1	49.4	37.7	27.6	18.7	10.8	3.6	(0.0)
NET FERTILITY [FERTILITY*[1-INFMORT/1000]]	3.5	3.1	2.9	2.7	2.6	2.4	2.3	2.2	2.1	2.0	1.9	(1.9)

NORMAL VARIATIONS IN ACCUMULATION PROCESSES
CORE AND PERIPHERY

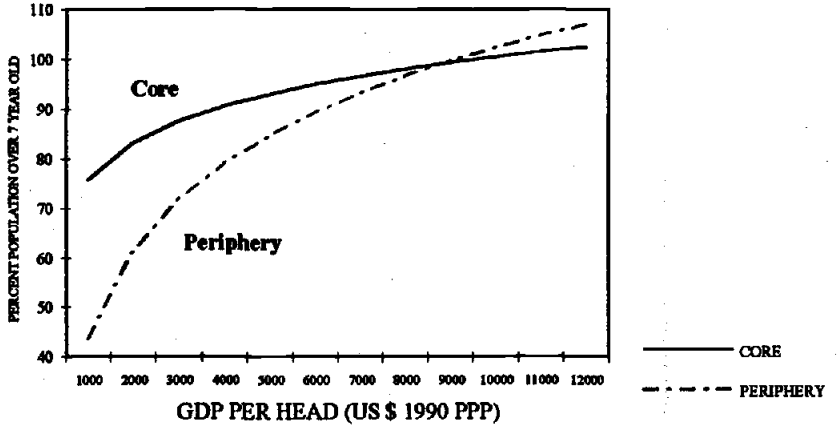
GRAPH 16

INVESTMENT



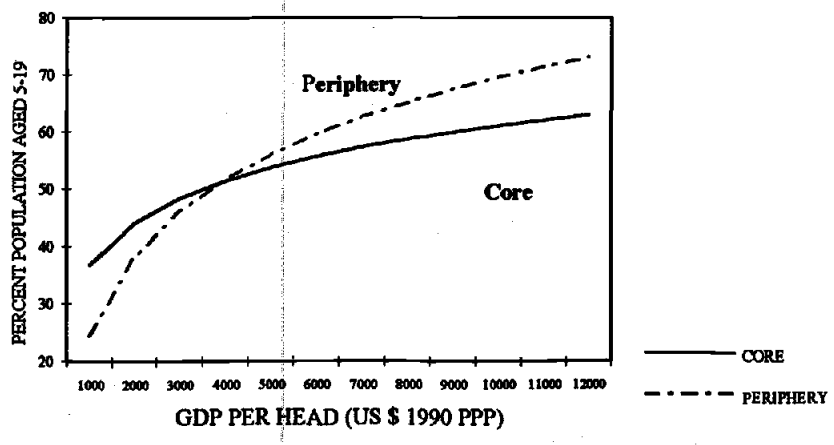
GRAPH 17

LITERACY



GRAPH 18

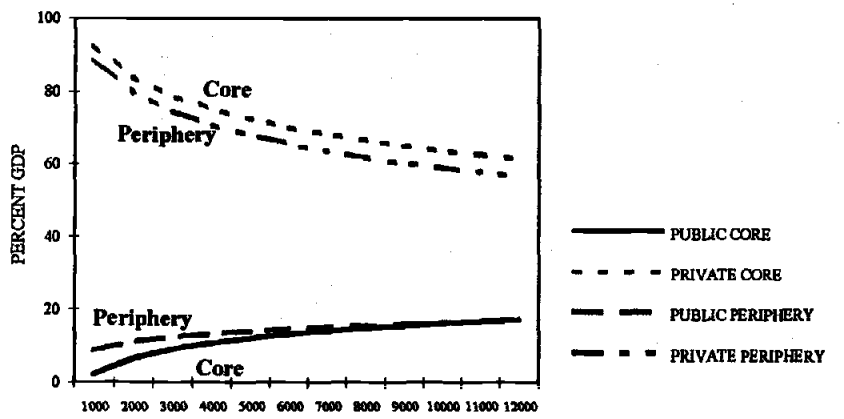
SCHOOLING



NORMAL VARIATIONS IN RESOURCE ALLOCATION PROCESSES
CORE AND PERIPHERY

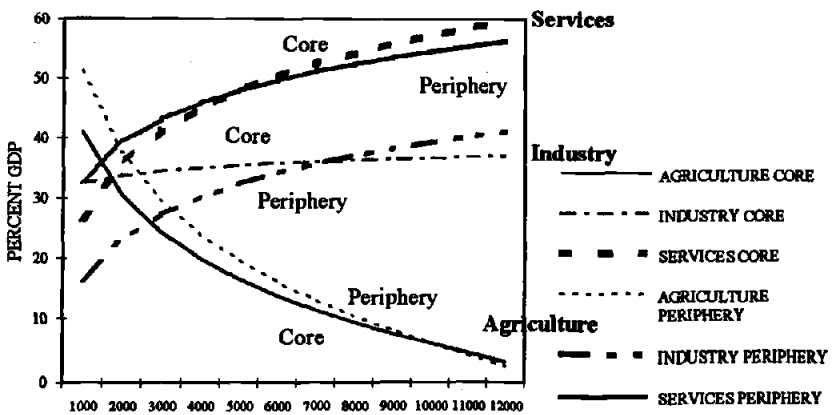
GRAPH 19

CONSUMPTION



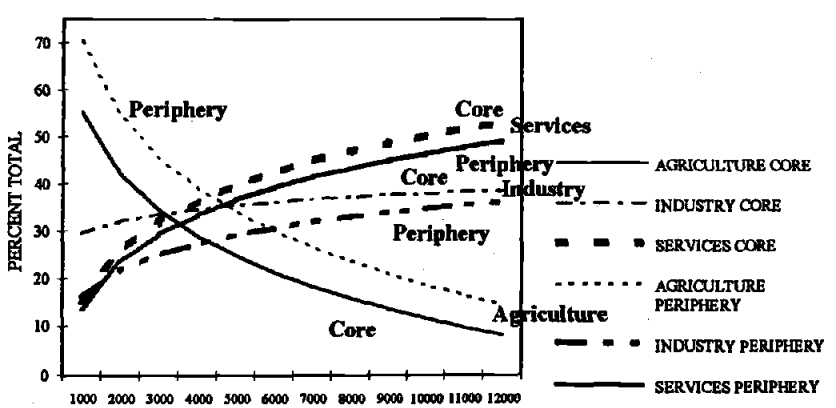
GRAPH 20

PRODUCTION



GRAPH 21

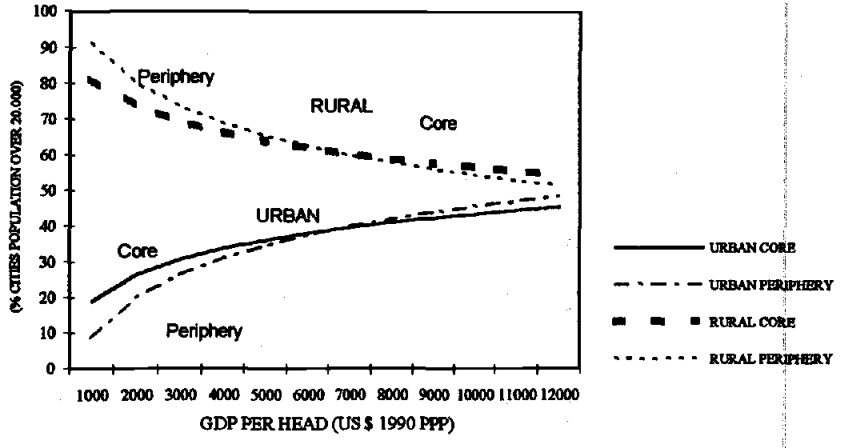
LABOUR



NORMAL VARIATIONS IN RESOURCE ALLOCATION PROCESSES
CORE AND PERIPHERY

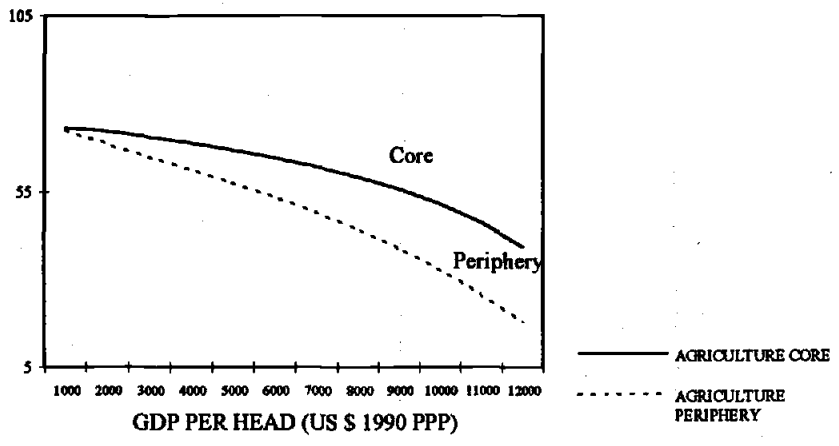
GRAPH 22

URBANIZATION



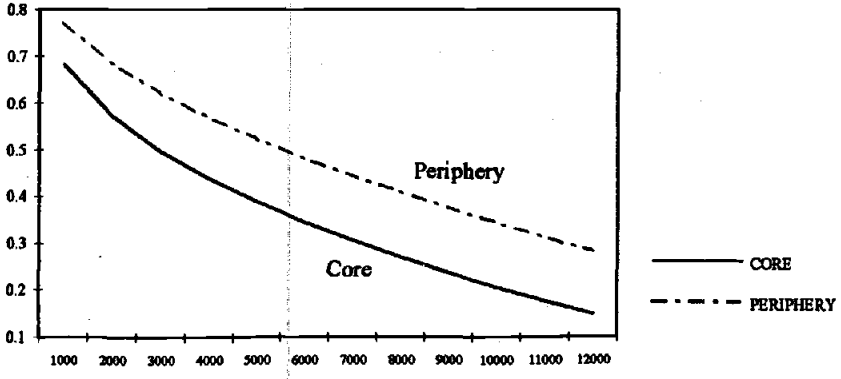
GRAPH 23

RELATIVE LABOUR PRODUCTIVITY



GRAPH 24

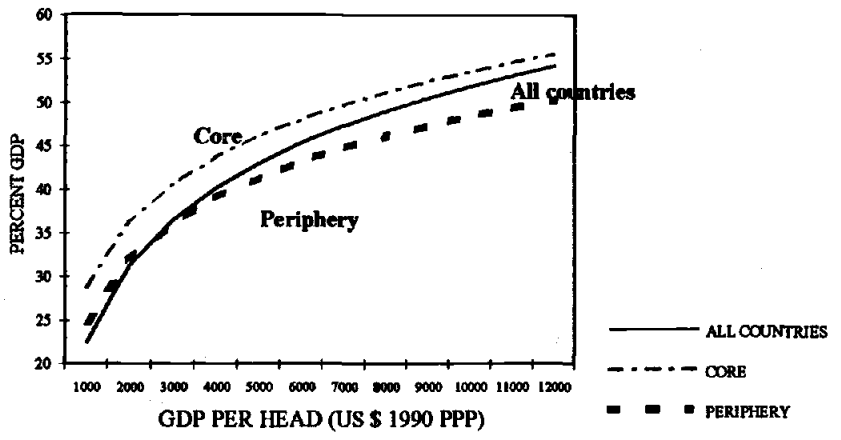
LABOUR FORCE IN AGRICULTURE OVER RURAL POPULATION



NORMAL VARIATIONS IN RESOURCE ALLOCATION PROCESSES
CORE AND PERIPHERY

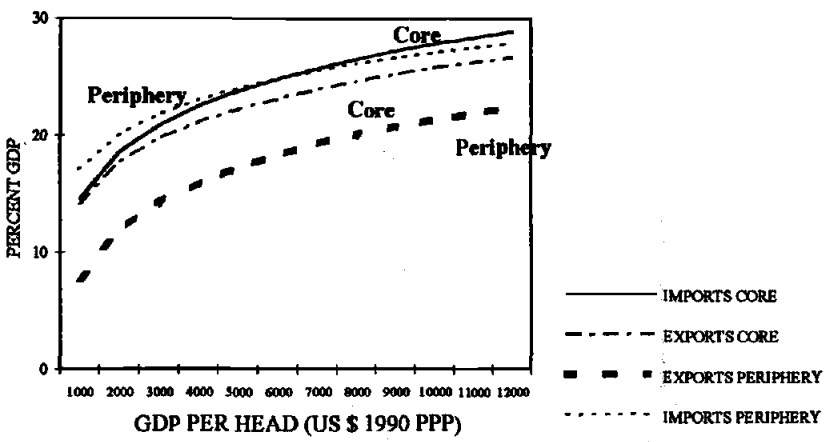
GRAPH 25

OPENNESS



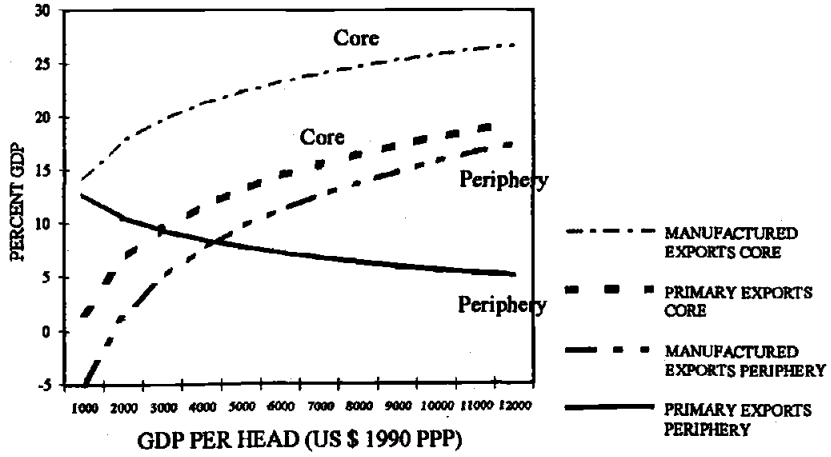
GRAPH 26

EXPORTS AND IMPORTS



GRAPH 27

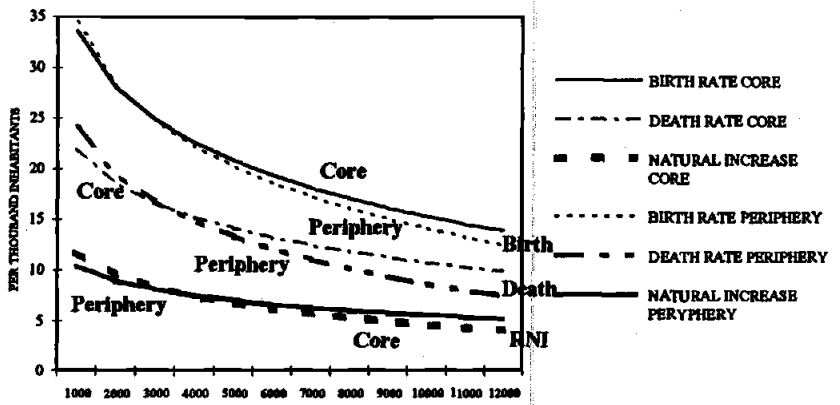
COMPOSITION OF EXPORTS



NORMAL VARIATIONS IN DEMOGRAPHIC TRANSITION PROCESSES
CORE AND PERIPHERY

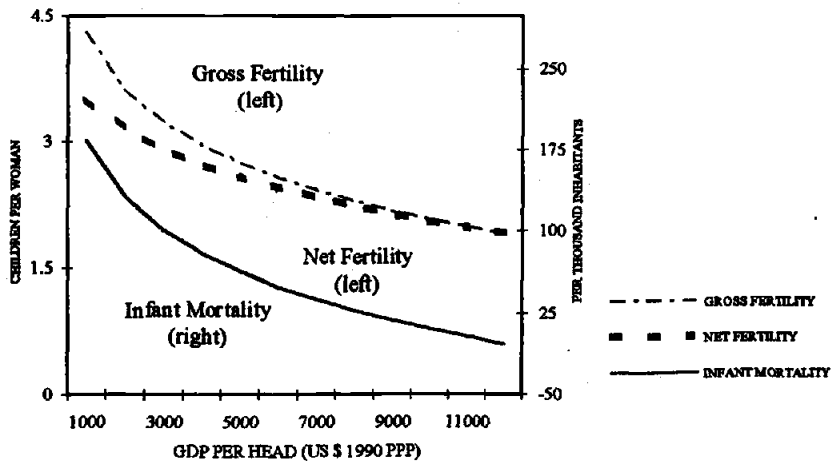
GRAPH 28

DEMOGRAPHIC TRANSITION
BIRTH AND DEATH RATES



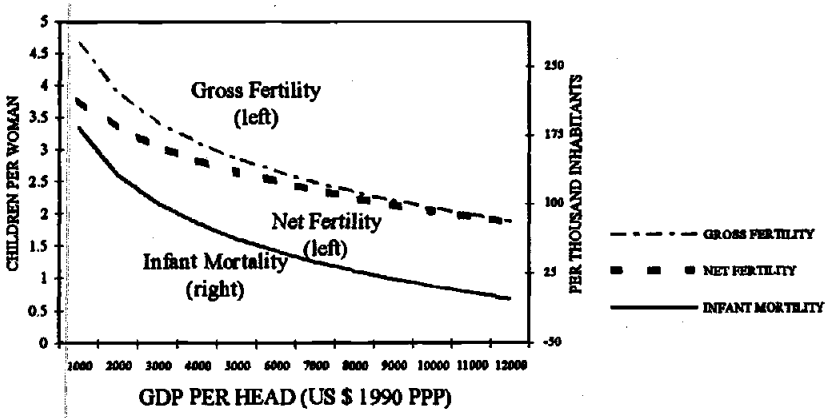
GRAPH 29

PERIPHERY
GROSS AND NET FERTILITY



GRAPH 30

CORE
GROSS AND NET FERTILITY



Tables 12 and 13 provide values for growth elasticities for each development process in Core and Periphery, covering most of the transition from a pre-industrial into a modern economy. As observed for the entire sample of countries, elasticities are higher at lower income levels, (and the opposite occurs when a negative relationship exists), while there is a large variance in their values. Elasticities are higher in the Periphery for physical and human capital formation, the contribution of industry to output and employment, urbanization, exports (total and manufactured), and natality and mortality (including infant mortality), and are lower for government consumption, share of services in output, and fertility (gross and net).

It is time now to compare the main conclusions from our patterns of development to Gerschenkron's perception of the different nature of late-comers to industrialization[34]. The comparison will allow us to realize the extent to which the new evidence confirms existing empirical regularities of development, or adds up new stylized facts. Only some of Gerschenkron's hypotheses about European development can be subjected to quantitative testing[35]. Among them, the following can be listed: the more backwards a country is, **a)** the faster the growth of its industrial production, **b)** the greater the stress on capital goods and technology, **c)** the stronger the pressure on private consumption, **d)** the less active the role of agriculture in industrialization, and **e)** the greater the role of institutional factors in promoting industrialization. The evidence presented here provides an empirical test if we associate proposition **a)**, to increases in the share of industry in output and employment; hypotheses **b)** and **c)** to the shares of GDP allocated to investment and private consumption; proposition **d)**, to the productivity gap and the relative size of agriculture in GDP and labour force,and, finally, hypothesis **e)** to the share of GDP assigned to government consumption. From the discussion above, it can be suggested that Gerschenkron's views are mostly confirmed. However, some caveats are necessary, i.e., in the Core the relative size of industry is larger, and government consumption grew faster, than in the Periphery. Moreover, comparative advantage in manufacturing appears to be stronger for the early starters.

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34 A critical assessment of Gerschenkron's views can be found in O'Brien (1986). For a reconsideration of Gerschenkron's views at the light of research during the last three decades, cf. Sylla and Toniolo (1992).

35 O'Brien (1986).

TABLE 12

CORE AND PERIPHERY:

NORMAL VARIATION IN GROWTH ELASTICITIES WITH THE LEVEL OF DEVELOPMENT*

-Predicted Values at Different Income Levels-

US 1990 $ PPP (G-K)

PROCESSES	CORE				PERIPHERY			
	1000	2000	4000	8000	1000	2000	4000	8000
ACCUMULATION								
Investment (% GDP)								
SAVING								
INVESTMENT	0.94	0.57	0.41	0.32	1.48	0.73	0.49	0.36
CAPITAL INFLOW								
Education (%)								
LITERACY	0.14	0.13	0.12	0.11	0.59	0.42	0.32	0.26
SCHOOLING	0.29	0.24	0.20	0.18	0.80	0.51	0.38	0.30
RESOURCE ALLOCATION								
Demand (% GDP)								
PRIVATE CONSUMPTION	-0.13	-0.12	-0.17	-0.19	-0.15	-0.16	-0.18	-0.21
GOVT. CONSUMPTION	2.46	0.92	0.56	0.40	0.38	0.30	0.25	0.21
Production (% GDP)								
AGRICULTURE	-0.37	-0.50	-0.76	-1.62	-0.38	-0.52	-0.81	-1.84
INDUSTRY	0.14	0.13	0.13	0.12	0.51	0.36	0.28	0.22
SERVICES	0.50	0.37	0.30	0.25	0.29	0.24	0.21	0.18
Labour Force (%)								
AGRICULTURE	-0.34	-0.45	-0.65	-1.19	-0.32	-0.41	-0.57	-0.95
INDUSTRY	0.14	0.13	0.12	0.11	0.48	0.36	0.29	0.24
SERVICES	0.99	0.59	0.42	0.32	1.06	0.61	0.43	0.33
Urbanization (%)								
URBAN POPULATION	0.56	0.40	0.32	0.26	1.84	0.81	0.52	0.38
Trade (% GDP)								
EXPORTS OF GOODS	0.36	0.29	0.24	0.21	0.77	0.50	0.37	0.30
PRIMARY EXPORTS	-	-	-	-	-	-	-	-
MANUFACTURED EXPORTS	4.17	1.07	0.62	0.73	-	7.50	1.20	0.66
IMPORTS OF GOODS	0.19	0.15	0.12	0.10	0.37	0.32	0.28	0.25
OPENNESS	0.37	0.30	0.25	0.21	0.42	0.32	0.26	0.44
DEMOGRAPHIC TRANSITION								
BIRTH RATE (o/oo)	-0.24	-0.28	-0.35	-0.49	-0.26	-0.31	-0.40	-0.55
DEATH RATE (o/oo)	-0.22	-0.26	-0.32	-0.41	-0.28	-0.35	-0.45	-0.66
FERTILITY	-0.24	-0.29	-0.36	-0.49	-0.22	-0.27	-0.32	-0.42
INFANT MORTALITY (o/oo)	-0.37	-0.51	-0.79	-1.74	-0.41	-0.57	-0.94	-2.73
NET FERTILITY[FERTILITY*[1-INFMORT/1000]]	-0.24	-0.28	-0.33	-0.42	-0.19	-0.21	-0.24	-0.30

* Computed as $\varepsilon_{x_t,y_t} = \frac{\alpha_1 + 2\alpha_2 \ln Y_t}{x_t}$, where a_1 and a_2 are the coefficients for lineal and quadratic terms of income (Y_t) in the regresssion, and x_t is the predicted value corresponding to the level of income at which the elasticity is being computed.

TABLE 13

CORE AND PERIPHERY:

NORMAL VARIATION IN GROWTH ELASTICITIES WITH THE LEVEL OF DEVELOPMENT*

-Predicted Values at Different Income Levels-

US 1990 $ PPP (G-K)

PROCESSES	CORE		PERIPHERY	
	1000-4000	4000-8000	1000-4000	4000-8000
ACCUMULATION				
Investment (% GDP)				
SAVING	0.730	0.395	1.284	0.498
INVESTMENT	0.600	0.363	0.805	0.421
CAPITAL INFLOW				
Education (%)				
LITERACY	0.130	0.113	0.429	0.292
SCHOOLING	0.241	0.192	0.537	0.335
RESOURCE ALLOCATION				
Demand (% GDP)				
PRIVATE CONSUMPTION	-0.149	-0.177	-0.162	-0.194
GOVT. CONSUMPTION	1.065	0.476	0.309	0.232
Production (% GDP)				
AGRICULTURE	-0.520	-1.089	0.544	-1.185
INDUSTRY	0.056	0.053	0.903	0.298
SERVICES	0.382	0.271	0.243	0.194
Labour Force (%)				
AGRICULTURE	-0.464	-0.867	-0.421	-0.730
INDUSTRY	0.111	0.100	0.381	0.247
SERVICES	0.623	0.370	0.653	0.375
Urbanization (%)				
URBAN POPULATION	0.416	0.286	1.833	0.505
Trade (% GDP)				
EXPORTS OF GOODS	0.289	0.215	0.523	0.331
PRIMARY EXPORTS	-0.183	-0.242	-0.063	-0.415
MANUFACTURED EXPORTS	1.379	0.512	1.453	0.869
IMPORTS OF GOODS	0.312	0.236	0.192	0.176
OPENNESS	0.301	0.226	0.330	0.241
DEMOGRAPHIC TRANSITION				
BIRTH RATE (o/oo)	-0.286	-0.402	-0.632	-0.464
DEATH RATE (o/oo)	-0.263	-0.365	-0.352	-0.551
FERTILITY	0.300	-0.431	-0.260	-0.383
INFANT MORTALITY (o/oo)	0.533	-1.39	-0.603	-1.535
NET FERTILITY [FERTILITY+[1-INFMORT/1000]]	-0.220	-0.348	-0.187	-0.296

*Elasticities with respect to GDP per head computed from Table 12 by dividing log differences:

$$\left[\mathrm{Ln}(X_T / X_0) / \mathrm{Ln}(Y_T / Y_0)\right].$$

Finally, from the description of the differences between stylized features of development in the Core and the Periphery, some interesting questions can be posed for further research. For instance, are latecomers penalised by the fact that their investment and consumption shares of GDP are larger and lower, respectively, at the same level of income of an early starter? Are they, actually, the result of a wider range of investment opportunities, as suggested by Chenery (1977:458)?. It could be argued that demonstration effects and the awareness that a higher rate of investment helps to catch-up are also probably behind such a differential. Moreover, in more recent periods, larger investment seems to be required to reach economies of scale and scope in modern industry and services.

V. Structural Change, Growth, and Convergence.

Patterns of development represent a most useful descriptive device to classify information about the main stylized facts of modern economic growth, but fall short of assessing the contribution of structural change to economic growth. The basic neoclassical model of Solow (1956) and Swan (1956) provides an appropriate framework to deal with these issues[36]. The Solow-Swan model predicts that in the steady state equilibrium, the level of *per capita* income will be determined by the technology embodied in the production function, the rate of saving, population growth, and technical progress, all three assumed exogenous. As a result of the Solow-Swan growth model, when a country is not at its steady state, the **growth rate of *per capita* income tends to be inversely related to the starting level of output per head**. In particular, if economies are similar in preferences and technology, poorer economies grow faster than richer ones. Thus, there is a force that promotes convergence in levels of *per capita* product. In this sense, the Solow-Swan model can be used as a framework to study convergence across countries. In neoclassical models, the main element behind convergence is diminishing returns to the physical capital. So, poor countries that have low capital/labour ratios and, therefore, high marginal products of capital tend, as a consequence, to grow at a faster pace.

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36 The assumption and structure of this model is very simple: a single homogeneous good, a neoclassical production function, exogenous labour augmenting technical progress, full employment and exogenous labour force growth. This model allows for smooth substitution between capital and labour, decreasing returns to capital, and flexible wages and prices. Cf. Mankiew, Romer and Weil (1992) for a discussion.

However, the hypothesis that poor countries tend to grow faster that rich ones seems to be inconsistent with the cross-country evidence which shows that GDP *per capita* growth rates have little correlation with the starting level of income[37]. As a consequence, the Solow-Swan model has been under attack by the new growth theorists, who dismiss it in favour of "endogenous growth" models, that assume constant or increasing returns to a broad concept of reproducible capital, including human capital. In these models the growth rate of *per capita* product is independent of the starting level of income.[38]

The different implications of the two growth models have given rise to a large number of empirical studies in recent years. Their main concern has been to test whether there is a long-run tendency towards unconditional convergence of *per capita* income levels across countries[39]. The empirical evidence against unconditional, convergence is not inconsistent, however, with the neoclassical growth model. In fact the Solow-Swan model does not predict unconditional convergence of *per capita* incomes across countries; rather, it predicts conditional convergence, that is, only after controlling for the determinants of the steady state[40].

Models in the Solovian tradition attribute variations in output to changes in human and physical capital stock and in labour force. Most researchers would recognize, however, that other elements also contribute to the differences in growth performance among countries. So, there exists an abundant literature which aims at explaining the observed patterns of growth and their determinants from an empirical, more inductive, point of view. These studies emphasize resource allocation, differences in technology, the degree of openness, institutional constraints, and demographic factors. In a sense, they continue the approach iniciated by Kuznets and Lewis (1954), who stressed the

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37 Cf. Abramovitz (1986), De Long (1988), Barro (1991), Durlauf and Johnson (1992).

38 Cf. Romer (1986), Lucas (1988), Rebelo (1990).

39 Cf. surveys by Crafts (1992) and Levine and Renelt (1992).

40 Recent work by Mankiw, Romer and Weil (1992), using a cross-sectional approach, defends the idea that the Solow-Swan model is consistent with the empirical evidence when human capital is incorporated. Other papers such as Knight, Loayza and Villanueva (1992) and Andrés, Doménech and Molinas (1993) extended the Mankiw, Romer and Weil model by using a panel of time-series cross-section data to determine the significance of country-specific effects by adding new explanatory variables for the growth of income per head, e.g., Knight, Loayza and Villanueva (1992) introduce countries' trade orientation policies and the level of social overhead capital because of their influence on the labour-augumenting technological change, while Andrés *et alia* (1993) consider the impact of medium term macroeconomic variables.

importance of shifts of resources from agriculture to industry, as determinants of economic development[41].

Growth in these desequilibrium models comes, not only from increasing aggregate inputs, but also from reallocating resources to more productive sectors[42]. Moreover, a substantial body of literature suggests that distinguishing between outward and inward-oriented sectors might be useful in comparing growth experiences across countries[43] Two hipotheses could, therefore, be tested. The first one is that shifting labour out of agriculture makes a contribution to growth. The most common argument is that marginal labour productivity is higher in the industrial sector (and modern services) because of its higher capital/labour ratio. The second one is that countries with favorable export growth records have generally enjoyed higher rates of economic growth. The benefits of export activities are explained by the fact that they introduce incentives for technological improvements and more efficient management that arise from competitive pressure abroad, permitting to exploit economies of scale. Thus, countries which have adopted exports promoting policies have benefited from a reallocation of resources from the low productive domestic sector to the higher factor productivity export sector. Furthermore, systematic differences across sectors in rates of technological progress, in capital deepening and technological spillover are additional explanations of growth and catch-up by late-comers[44].

To sum up, we could say that according to these empirical studies, growth of income per head is determined by a distinctive set of economic variables:

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41 Along these lines, cf. Feder (1986), Dowrick and Gemmell (1991), Barro (1991) , Barro and Lee (1933)

42 Feder (1986) considers a two sector model in which marginal factor productivities are assumed to differ, and obtains an equation in which growth is determined by accumulation in inputs and by the resource shifts from sectors of low to sectors of high productivity.

43 Feder (1986) developed a two sector model, one producing for the domestic market, and the other for the foreign market, and he ended up with an equation in which the growth of GDP is determined by the usual Solovian variables and the growth of exports.

44 Cf. Dowrick and Nguyen (1989) and Dowrick and Gemmell (1991). Dowrick and Nguyen (1989) assume that technological catch up is a function of the ratio of each country's labour productivity to that of a "leading" country. Thus, the larger the productivity gap, the greater the potential for copying, buying or transferring the technological advances of the leading countries. This suggests a negative relationship between productivity levels and economic growth. Dowrick and Gemmell (1991), in turn, disaggregate catching-up effects. They distinguish between a catching-up effect due to the fact that rates of technological progress may differ systematically across countries according to their stage of development, as Dowrick and Nguyen (1989) do, and an "internal catch-up" that occurs within a country if its industrial sector is relatively advanced and is supplying capital goods to the agricultural sector.

$$GY = g_1[\alpha, C_{it}] + g_2[\beta, A_{it}] + g_3[\gamma, R_{it}] + g_4[\mu_i, V_{it}] \qquad (4)$$

where α, β and γ are vectors of time and cross-country invariant parameters; C_{it} is the set of variables representing catching up or conditional convergence , that is, the initial levels of income and schooling; A_{it} is a set of variables which represents the accumulation process, i.e., the ratio of investment to GDP and population growth; and R_{it} is a set of variables representing resource allocation processes. Finally, μ_i is a time invariant, but cross-country variant, vector of parameters, and V_{it} represents a set of explanatory variables, including a stochastic disturbance (which incorporates policy, institutions, political instability and so on)[45].

The aim of our econometric exercise is to find empirical regularities in economic growth for our set of European countries. Thus, according to our specification, the rate of growth of income per head is determined by a set of economic variables accounting for conditional convergence, accumulation and resource allocation, and a residual that incorporates institutional change. Behind the equation lies, nevertheless, a reduced form of a non-specified growth model. This approach raises theoretical problems, as regards the interpretation of the parameters. Tables 14 to 16 report regression results for the growth rate of real *per capita* GDP. The same econometric specification has been estimated for all the countries in the sample, and for Core and Periphery. Columns 1 to 4 in Table 14 show regressions for the growth rate of GDP per head for all the countries in the sample. These empirical specifications relate the dependent variable to the initial levels of (log of) income and primary and secondary school enrollment, as a proxy to human capital, the ratio of gross domestic investment to GDP, which enters into the regressions as a decade average (in order to proximate the steady-state level of investment). Resource allocation indicators are also included to take into account the shift of resources away from agriculture, and they are proximated by the initial share of labour force in agriculture and the average ratio of agricultural to industrial output. Moreover, openness has been measured by the growth rate of the exports ratio to GDP. Finally, a time trend dummy was included to capture temporal changes in the dependent variable not associated with variation in the independent

45 Cf. Barro and Lee (1993).

variable. Lagged and initial values of the explanatory variables have been used as instruments.

The estimated coefficient of the initial level of *per capita* real GDP is negative, as reported in other studies about conditional convergence. That means, that countries with a lower starting GDP per head grow faster. When we accept that countries have a different steady-state equilibrium, convergence accelerates. Thus, the magnitude of the implicit speed of convergence implied by equations (1) to (3) is slightly below the usual 2%, but when structural change indicators are included in a equation (4), the speed of convergence is higher (5%). Fixed effects, correlated with the initial level of income, seem to be captured by our structural indicators and this accounts for the large differential in the speed of convergence between equations (1) to (3) and (4).

The remaining coefficients show the expected relations, positive for accumulation and openness, and negative for tying up resources to agriculture. For the coefficient of LSPOI, it suggests that countries with a high agricultural-industrial output ratio tend to grow more slowly. A surprising finding is the coefficient of AGLAB, since it suggests that a large initial share of labour force in agriculture reduces the growth rate, when just the opposite would be expected, i.e., countries with a large agricultural sector in the initial period would have more opportunities to grow faster by shifting labour towards the industrial sector.

Finally, we allowed for a boost to growth from post-war episodes of reconstruction, the 1920's and 1950's, using as proxies the postwar-prewar *per capita* income ratio, i.e., 1920/1913 income ratio and 1950/1938 income ratio, and its quadratic term to incorporate its diminishing impact on growth[46]. Columns 5-8 in Table 14 report the regression results when the reconstruction dummies are included. While there are no significant changes in the estimated coefficients for the rest of regressors, their joint effect permits us to suggest that reconstruction processes have a positive effect on growth .

Tables 15 and 16 report the regression results for Core and Periphery, respectively, and some differences are worth noticing. Unconditional

46 We follow here Dumke (1990), Crafts (1992) and Barro and Lee (1993).

TABLE 14

DETERMINANTS OF GROWTH IN EUROPE. 1820-1990: ALL COUNTRIES

-POOL REGRESSION FOR GDP PER HEAD'S RATE OF GROWTH -

(Estimation Method: TSLS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.0811 (5.490)	0.1030 (6.296)	0.1064 (6.156)	0.2976 (8.323)	0.0714 (4.721)	0.0944 (5.462)	0.1003 (5.448)	0.2630 (6.966)
LY90	-0.0119 (-5.392)	-0.0157 (-6.597)	-0.0171 (-6.264)	-0.0398 (-9.318)	-0.0103 (-4.571)	-0.0144 (-5.719)	-0.0162 (-5.880)	-0.0353 (-7.694)
SINVT		0.1158 (5.025)	0.1089 (4.233)	0.1129 (4.641)		0.1208 (5.042)	0.1117 (4.186)	0.1074 (4.428)
GPOP1		0.1252 (0.548)	0.1685 (0.365)	0.1483 (0.562)		0.1046 (0.452)	0.1333 (0.446)	0.1330 (0.516)
ESCOLAR			0.0038 (0.365)	-0.0062 (-0.655)			0.0048 (0.454)	-0.0036 (-0.387)
AGLAB				-0.0316 (-1.908)				-0.0263 (-1.605)
LSPOI				-0.0080 (-2.981)				-0.0075 (-2.825)
GXB				0.0677 (1.903)				0.0786 (2.241)
TBIAS	0.0003 (8.944)	0.0002 (5.135)	0.0003 (4.831)	0.0004 (5.912)	0.0003 (7.625)	0.0002 (4.228)	0.0003 (4.133)	0.0003 (4.982)
RCNSTRC					-0.0034 (-0.383)	-0.0081 (-0.915)	-0.0647 (-0.502)	-0.0141 (-1.467)
RCNSTRC2					0.0966 (2.812)	0.0469 (1.384)	0.0386 (1.058)	0.1018 (2.364)
N° Obs.	163	127	108	89	163	127	108	89
$\overline{R}^2$	0.364	0.516	0.525	0.709	0.387	0.518	0.521	0.722
S.E.Regression	0.012	0.010	0.010	0.008	0.012	0.010	0.011	0.008
F-Statistic	47.455	34.628	24.615	27.776	26.598	23.544	17.613	23.874
Speed of Convergence	0.0127	0.0170	0.0187	0.0507	0.0108	0.0155	0.0176	0.0435

Instruments: Lagged and initial values of regressors.

Constant: Constant term.

LY90: Log of real *per capita* GDP at the beginning of each period, in 1990 US $, PPP.

SINVT: Ratio of gross domestic investment to GDP, calculated as ten-year averages.

GPOP1: Rate of population of growth.

ESCOLAR: Primary and secondary school enrollment as a ratio to population aged 5 to 19 at the beginning of each period.

AGLAB: Labour force in agriculture as a ratio to total labour force at the beginning of each period.

LSPOI: Index of production orientation (Log of Agricultural-Industrial output ratio), calculated as ten-year averages.

GXB: Growth rate of exports ratio to GDP.

TBIAS: Time trend.

RCNSTRC: Dummy of reconstruction processes. For 1950-1960, it is the log of 1950/1938 *per capita* income ratio; for 1920-1929, the log of 1920/1913 *per capita* income ratio; otherwise, takes zero value.

RCNSTRC2: Square of RCNSTRC.

TABLE 15

DETERMINANTS OF GROWTH IN EUROPE. 1820-1990: CORE

-POOL REGRESSION FOR GDP PER HEAD'S RATE OF GROWTH -

(Estimation Method: TSLS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.1620	0.1390	0.1673	0.3088	0.1506	0.1315	0.1571	0.3161
	(5.575)	(5.124)	(4.815)	(6.167)	(5.004)	(4.737)	(4.352)	(5.840)
LY90	-0.0230	-0.0205	-0.0248	-0.0419	-0.0212	-0.0193	-0.0235	-0.0430
	(-5.354)	(-5.126)	(-5.115)	(-6.846)	(-4.767)	(-4.725)	(-4.721)	(-6.383)
SINVT		0.0904	0.0725	0.0763		0.0834	0.0631	0.0774
		(3.474)	(2.409)	(2.975)		(3.092)	(2.012)	(2.838)
GPOP1		0.2781	0.5640	0.7827		0.2505	0.6615	0.7293
		(1.189)	(1.647)	(2.448)		(1.029)	(1.597)	(2.127)
ESCOLAR			-0.0087	-0.0135			-0.0031	-0.0156
			(-0.508)	(-1.015)			(-0.178)	(-1.090)
AGLAB				-0.0338				-0.0312
				(-1.591)				(-1.398)
LSPOI				-0.0049				-0.0056
				(-1.809)				(-1.831)
GXB				0.1092				0.1067
				(2.576)				(2.438)
TBIAS	0.0004	0.0003	0.0004	0.0005	0.0004	0.0003	0.0004	0.0005
	(6.681)	(4.836)	(4.179)	(5.707)	(5.810)	(4.500)	(3.903)	(5.431)
RCNSTRC					-0.0060	-0.0162	-0.0245	0.0104
					(-0.419)	(-1.110)	(-1.131)	(0.534)
RCNSTRC2					0.1125	0.0879	0.1005	-0.0291
					(2.126)	(1.669)	(1.318)	(-0.395)
N° Obs.	91	76	57	47	91	76	57	47
$\overline{R}^2$	0.360	0.461	0.494	0.746	0.388	0.466	0.492	0.734
S.E.Regression	0.010	0.009	0.009	0.006	0.010	0.009	0.009	0.006
F-Statistic	26.343	17.007	11.955	17.869	15.243	11.927	8.746	13.683
Speed of Convergence	0.0261	0.0229	0.0285	0.0543	0.0238	0.0214	0.0267	0.0562

Instruments: Lagged and initial values of regressors.

Constant:	Constant term.
LY90:	Log of real *per capita* GDP at the beginning of each period, in 1990 US $, PPP.
SINVT:	Ratio of gross domestic investment to GDP, calculated as ten-year averages.
GPOP1:	Rate of population of growth.
ESCOLAR:	Primary and secondary school enrollment as a ratio to population aged 5 to 19 at the beginning of each period.
AGLAB:	Labour force in agriculture as a ratio to total labour force at the beginning of each period.
LSPOI:	Index of production orientation (Log of Agricultural-Industrial output ratio), calculated as ten-year averages.
GXB:	Growth rate of exports ratio to GDP.
TBIAS:	Time trend.
RCNSTRC:	Dummy of reconstruction processes. For 1950-1960, it is the log of 1950/1938 *per capita* income ratio; for 1920-1929, the log of 1920/1913 *per capita* income ratio; otherwise, takes zero value.
RCNSTRC2:	Square of RCNSTRC.

TABLE 16

DETERMINANTS OF GROWTH IN EUROPE. 1820-1990: PERIPHERY

-POOL REGRESSION FOR GDP PER HEAD'S RATE OF GROWTH -

(Estimation Method: TSLS)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.0731	0.1475	0.1437	0.2947	0.0597	0.1633	0.1597	0.2521
	(3.257)	(5.943)	(5.657)	(4.464)	(2.507)	(5.424)	(5.296)	(3.892)
LY90	-0.0123	-0.0244	-0.0237	-0.0412	-0.0101	-0.0267	-0.0259	-0.0354
	(-3.513)	(-6.539)	(-6.101)	(-5.761)	(-2.703)	(-5.873)	(-5.641)	(-4.740)
SINVT		0.1769	0.1802	0.1700		0.2077	0.2154	0.2021
		(4.681)	(4.719)	(3.118)		(5.054)	(5.192)	(3.499)
GPOP1		-0.7324	-0.7752	-0.5308		-0.9716	-1.0595	-0.7295
		(-1.744)	(-1.823)	(-1.308)		(-2.248)	(-2.423)	(-1.819)
ESCOLAR			-0.0102	0.0015			-0.0149	0.0073
			(-0.781)	(0.090)			(-1.150)	(0.487)
AGLAB				-0.0015				0.0046
				(-0.048)				(0.157)
LSPOI				-0.0137				-0.0125
				(-2.444)				(-2.429)
GXB				0.0096				0.0094
				(0.167)				(0.168)
TBIAS	0.0004	0.0004	0.0004	0.0003	0.0003	0.0004	0.0004	0.0002
	(6.744)	(4.648)	(4.666)	(2.205)	(5.441)	(3.915)	(4.090)	(1.293)
RCNSTRC					0.0013	-0.0267	-0.0295	-0.0353
					(0.088)	(-1.921)	(-2.095)	(-2.356)
RCNSTRC2					0.0914	-0.0612	-0.0687	0.0784
					(1.443)	(-0.972)	(-1.090)	(0.904)
N° Obs.	72	51	51	42	72	51	51	42
$\overline{R}^2$	0.447	0.682	0.679	0.728	0.452	0.694	0.695	0.776
S.E.Regression	0.013	0.010	0.010	0.009	0.013	0.010	0.010	0.008
F-Statistic	29.673	27.764	22.145	14.713	15.636	19.818	17.300	15.199
Speed of Convergence	0.0131	0.0279	0.0270	0.0531	0.0105	0.0310	0.0299	0.0436

Instruments: Lagged and initial values of regressors.

Constant:	Constant term.
LY90:	Log of real *per capita* GDP at the beginning of each period, in 1990 US $, PPP.
SINVT:	Ratio of gross domestic investment to GDP, calculated as ten-year averages.
GPOP1:	Rate of population of growth.
ESCOLAR:	Primary and secondary school enrollment as a ratio to population aged 5 to 19 at the beginning of each period.
AGLAB:	Labour force in agriculture as a ratio to total labour force at the beginning of each period.
LSPOI:	Index of production orientation (Log of Agricultural-Industrial output ratio), calculated as ten-year averages.
GXB:	Growth rate of exports ratio to GDP.
TBIAS:	Time trend.
RCNSTRC:	Dummy of reconstruction processes. For 1950-1960, it is the log of 1950/1938 *per capita* income ratio; for 1920-1929, the log of 1920/1913 *per capita* income ratio; otherwise, takes zero value.
RCNSTRC2:	Square of RCNSTRC.

convergence is stronger in the Core than in the Periphery, (the implicit speed of convergence is 2.5% against 1.3% (equations (1) and (5))). When we account for conditional convergence, no substantial differences between Core and Periphery are noticeable (equations (2)-(4) and (6)-(8)). The coefficient for investment seems to be larger for the late-comers, suggesting a more important role for investment in the Periphery. In the case of resource allocation, the estimated coefficient for LSPOI tends to be more significant, and has a greater value, in the case of the peripheral countries, while the one for AGLAB is also negative in both groups of countries but rather less significative. Finally, exports growth seems to be a more important determinant of growth in the Core, while demographic pressure appears stronger in the Periphery and represents a deterrent of growth (it has a negative sign in the regression).

The regressions reported in Tables 14-16 show a good fit, with little more than one-fourth of the variance unexplained, and could be used to carry out a simulation exercise in order to illustrate the relative importance of different determinants of growth across countries and over time. We must be aware, however, of the fact that the estimated coefficients only represent partial correlations between the dependent variable, the growth rate of the real GDP per head, and a set of explanatory variables.

In sections III and IV of the paper we derived what we called the normal variations of different development processes associated to increases in GDP per head, i.e., the relationship between the changes in each structural indicator and the rise in *per capita* income, once the country-specific features had been removed and with no reference to time. A major issue emerging from Tables 6, 10 and 11 is that most development processes were half-completed at early stages of development, somewhere in between US $ 3,000-4,000. So we chose US $ 4,000 as the level of income for our simulation exercise. Thus, assuming that a country departs from an income per head of US $ 4,000, and that, therefore, it enjoys a given level of structural change according to the European patterns of development, we performed the simulations reported in Table 17. Equations labeled 4 in Tables 14-16 were used to simulate the growth rates for a series of benchmark years for all countries, and for Core and Periphery. The first feature that deserves to be highlighted is that the simulated growth rate of GDP per head is higher as we approach the present, and is larger in the Core than in the Periphery. This implies that the transition from low to high income levels takes place at a faster pace as we move forward in time.

We can break down the simulated values of growth rates into the contributions of each explanatory variable that appears in equations 4 (Tables 14-16). The major shortcoming of this growth accounting type exercise is that the growth rate depends not only on these variables but also on the combined influence of all of them (and we are not taking the latter into account) In spite of this restriction, the exercise can be summarized into four sources of growth: a) catch up or conditional convergence, which includes the initial values of income and schooling, the time trend and the constant term; b) investment, as a proxy for the accumulation of physical capital; c) population growth, to proximate the accumulation of labour, and finally, d) resource allocation effects that incorporate the shifts of resources away from agriculture and the degree of openness.

In Table 17, we observed that growth tends to accelerate as we move forward in time. This is a result of conditional convergence; i.e., a country with an income per head of US $ 4,000 in 1913 was a comparatively rich country, with no incentive to catch up, whereas the same income level in 1960 represents a retarded position for which a powerful incentive to catch up with the leading countries exists. The stronger effect for the Periphery confirms the assertion. Some additional comments are worth making. The role of investment reduces as the catch-up effect increases; the negative contribution of resource allocation suggests an obstacle to growth derived from attaching resources to agriculture. We repeated the exercise for Core and Periphery. The main differences between both groups of countries are the following: a) the faster growth in the Periphery; b) the larger relative contribution of investment to growth among late comers; c) a more intense population pressure tends to decrease the growth rate in Peripheral countries and, d) resource allocation has a net positive contribution to growth in the Periphery.

TABLE 17

SOURCES OF GROWTH IN EUROPE

-SIMULATIONS AT US 1990 $ 4,000 PPP (%)-

	GROWTH RATE OF GDP PER HEAD	CATCH-UP CONDITIONAL CONVERGENCE	DOMESTIC INVESTMENT	POPULATION GROWTH	RESOURCE ALLOCATION
ALL COUNTRIES					
1913	1.63	0.33			
1929	2.19	0.89			
1938	2.50	1.20	1.87	0.11	-0.68
1950	2.92	1.62			
1960	3.27	1.97			
CORE					
1913	2.07	0.99			
1929	2.86	1.78			
1938	3.31	2.23	1.12	0.58	-0.62
1950	3.91	2.83			
1960	4.40	3.32			
PERIPHERY					
1913	3.23	-1.75			
1929	3.64	-1.34			
1938	3.87	-1.11	5.11	-0.39	0.26
1950	4.17	-0.81			
1960	4.43	-0.55			

VI. Conclusions.

In this paper, we have looked at the determinants of growth and convergence in Europe in a historical perspective. Europe provides a suitable scenario for testing regularities of growth since, in general, a common set of institutions, policies, and resource endowments are shared by all countries. We have surveyed long-term trends in *per capita* income growth over time (for one and a half centuries) and across countries (on average, 16 national cases are included in our sample). On such a statistical basis, patterns of development, that associate structural change to variations in GDP per head and population, have been constructed, and a growth equation, in which changes in *per capita* GDP growth are related to the initial levels of income and schooling, and to changes in accumulation and resource allocation, was estimated.

Our main results can be summarized as follows:

1) Growth of GDP per head became a generalized phenomenon in Europe by mid-nineteenth century, while, at the same time, differences in pace of growth across countries widened the gap in *per capita* income between early and late-starters. Moreover, in the Periphery, countries grew below average in phases of slackening economic activity.

2) Catching-up, or β-convergence, was investigated by testing an inverse relationship between the growth of GDP per head and initial levels of income. Although a quick glance at the results might suggest that β-convergence occurs over the entire time span considered, a closer examination reveals that it is a post-1950 phenomenon affecting mainly advanced, Core countries.

3) In turn, σ-convergence, a measure of the cross-sectional dispersion of GDP per head levels across countries, has been studied. The results are consistent with those for β-convergence. Thus, the dispersion of income per head only decreases over time for the Core countries.

4) Patterns of development, defined along the lines of Chenery & Syrquin (1975) pathbreaking work, were constructed to test whether a common set of development processes was observable for the whole of Europe. Moreover, the patterns helped us to investigate the extent to which structural reasons, that is, differential behaviour in accumulation, resource allocation, and demographic

transition, are behind the distinctive, retarded performance of Peripheral countries. Our results confirm most of Gerschenkron (1962) perceptions of the different nature of development among late-comers.

5) Since patterns of development fall short of weighting the contribution of each development process to growth, a conditional convergence equation was estimated. Thus, the growth rate of GDP per head was related to the initial levels of income and schooling (as a proxy for the endowment of human capital at the beginning of each period), the domestic investment ratio to GDP (to proximate physical capital accumulation), the rate of population growth (as an index of labour accumulation), indicators for resource allocation measuring the shift of labour and capital away of agriculture and the openness of the economy, plus a residual that captures institutions and policy. It emerges from the econometric exercise, that catching up plays a positive role in accelerating growth, and that, in fact, convergence tends to be stronger when it is conditioned on accumulation and resource allocation, as the implicit speed of convergence points out. The contribution of investment complements the catching-up effect, while opening up to international competition and transferring resources from agriculture to modern industry and services, have got an important effect to growth, as well. When a distinction is made between Core and Periphery, it appears that a milder role for catching-up was partially offset in the Periphery by a larger contribution of investment. A growth accounting exercise illustrates this point.

6) Some avenues for research can, now, be proposed. As Chenery & Syrquin (1975:64) pointed out, "the analysis of the uniformity of development patterns constitutes a first step towards identifying the sources of diversity". Thus, each country's deviations from the estimated patterns at a given level of income per head and population, are associated to country-specific characteristics such as resource endowments, institutions, and policies, that deserve to be investigated. The fact that Peripheral countries fared worse in periods of faltering growth could be attributed to existing structural differences with Core countries. However, only a test showing whether countries deviating from the European patterns of development are penalized may provide an answer. Our convergence equation could help us to assess the impact of deviating from the patterns on a particular country.