ECONOMIC GROWTH AND CYCLES IN EUROPEAN UNION, USA AND JAPAN 1900-1999. **A general view and analysis of causal relations**.

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1.- Introduction

The analyses of economic cycles in OECD countries during the last century, show there is a lower intensity of fluctuations in the second half than in the first. Conversely, the second half has had a greater intensity of economic growth, as a consequence of several factors such as peace, good economic policy for industrialised countries, the development of science and technology and the increase in the educational levels of populations and labour force in many countries of the European Union, the USA, Japan and other countries.

It is also possible that the diminishing intensity of economic fluctuation in industrialised countries was due to the large development of services in the advanced stages of economic growth.

Some centuries ago many cycles arose from agricultural crisis, and during the 19th century, up until the great depression of 1929, industry and external trade became one of the most important causes of economic fluctuation and its international transmission. Now external trade continues to be a cause of fluctuation but the lack of industrial supply or demand is generally not problematic for advanced economies.

This cause is of importance, however, when analysing the consequences of internal and external fluctuation of the economic growth process of less developed countries, LDC´s, especially at this time when they are trying to base their growth in profits derived from external trade. We analyse the important role that industry and external trade play in economic growth and cycles in section 4.

First, in section 2, we present a general view of growth and cycles during the 20th century in the EU, the USA and Japan, and section 3 includes some comments about the importance of taking into account causal relations between supply and demand.

2.- Evolution of GDP, Population and Production by head in 1990-1997

For the 15 European countries belonging to European Union, EU, in 2000, real GDP multiplied by 9.3 throughout the century, going from 805 billions of dollars, at 1990 prices, in 1990 to 7527 in 1997. As population in the EU multiplied by only 1.6, from 233.7 million people in 1900 to 374.1 in 1997, the result was that real GDP per inhabitant multiplied by nearly 6, going from 3.4 thousands of dollars in 1990 to 20.1 in 1997.

En USA real GDP multiplied by 18.7, from 353.5 billions of dollars in 1990 to 6629.5 in 1997, while population multiplied by 3.5, rising from 76.1 million people in 1900 to 266.7 million in 1997. The result was that real GDP per inhabitant multiplied by 5.3, going from 4.6 thousand $ to 24.85 in 1990.

In Japan real GDP multiplied by 50.7, from 65.8 thousands of dollars in 1900 to 3343.7 in 1997, while population multiplied by 2.8, rising from 43.8 million people in 1900 to 126.1 million in 1997. As a consequence real GDP by inhabitant multiplied by 17.6, from only $1.5 thousand 1990 to the incredibly high value of $26.5 thousand in 1997. These figures imply that Japan has experienced a very important economic evolution in world terms, having the greatest growth rate of real GDP and also the greatest growth rate of production per inhabitant.

USA was the richest of the three, both at the beginning and at the end of the 20th century, in great part due to the educational level of the population which was higher here than in Japan and in the large majority of EU countries. All of them have attained a very high level of production per inhabitant which means they potentially have a good level of welfare.

Some people in these countries have not reached a level close to the mean due to problems of work and wealth distribution but these countries have the capacity to improve conditions for all their citizens.

From another perspective, as the world income per head at the end of the 20th century only reached the level of that of the USA in 1900, we can see that these countries are extremely fortunate and ought to become heavily involved in common policies which encourage the economic and social development of less developed countries, LDCs.

Table 1 and Graph 1 show the evolution of real PH in the EU, the USA and Japan and includes also, for the purpose of comparison, the values of this variable in Ireland, Spain and Switzerland. The real production by head is expressed in dollars at 1990 prices and ex-change rates.

The case of Switzerland is very prominent as this country has already devoted, in 18th and 19th centuries, a great deal of attention to education. This policy has lead to very high standards of economic and social welfare. In some aspects this country is a positive example for many others, even for USA as they also have very high standards of wellbeing in important areas such as very low levels of delinquency and in the eradication of poverty through efficient social policy.

It is also interesting to observe the comparison between Spain, Ireland and Japan. These countries had very similar PH values in 1900, but Japan was the first of them to see an increase in the real rate of growth experiencing higher values from 1960 onwards and Ireland began an important take-off in 1987. Although Spain has experienced and important growth this country has not performed as well as Ireland and Japan during the second half of 20th century, mainly due to the lower values of expenditure in education and civil research in Spain and the consequences of these factors on economic growth.

On the other hand Graphs 2, 3 and 4 show the rates of growth of real GDP in the USA, Japan and the EU, the latter being a group of 6 European countries representing the evolution of the EU, including Germany, UK, France, Italy, Spain and the

Netherlands. We observe that the main fluctuations were due to the second world war and to the 1929-33 economic crisis of the USA and its international consequences.

The speedy rate of post-war recovery is remarkable, especially in Japan were the war resulted in a significant decrease in the level of production in percentage terms.

Graph 1

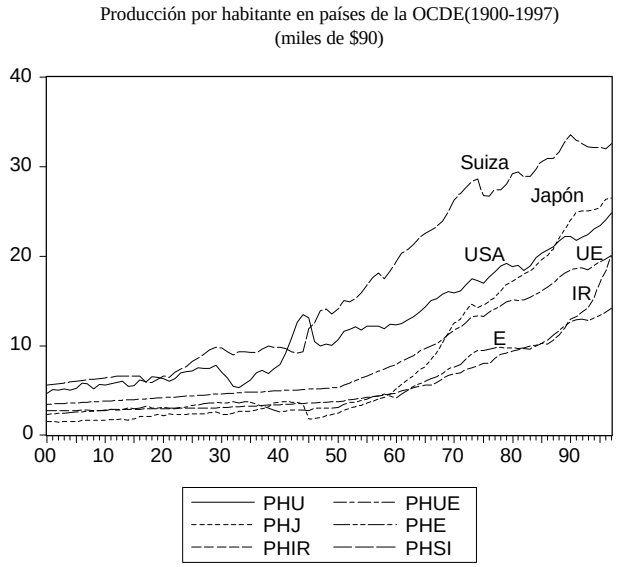


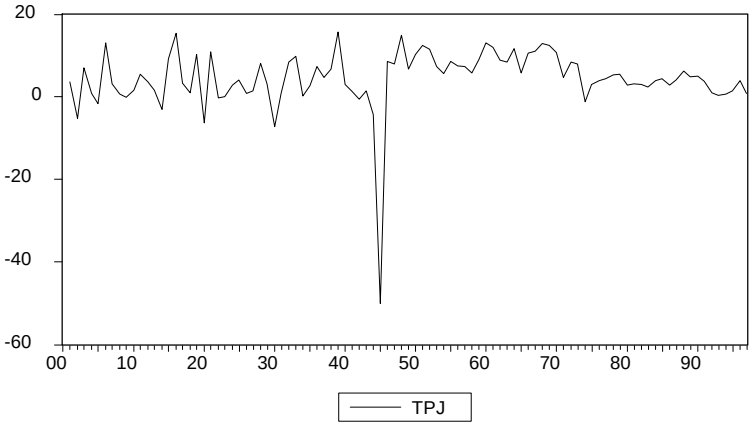
Table 1

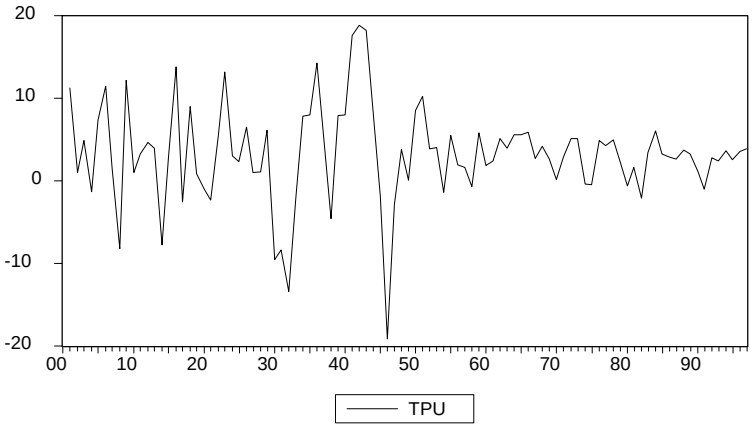
Gross Domestic Product, Population and Production per inhabitant 1900-97

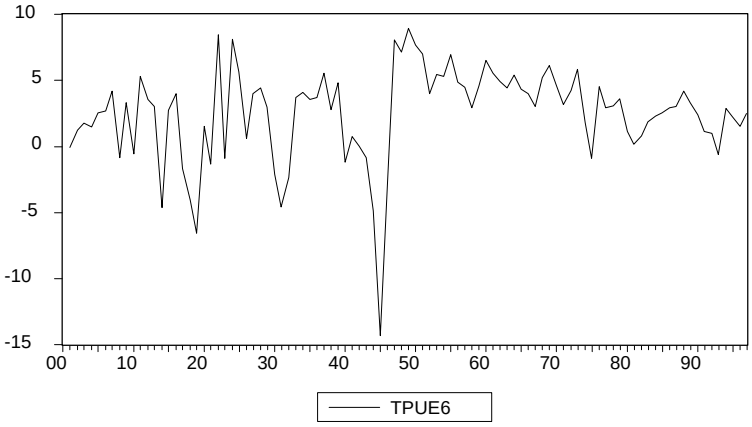
	GDP90EU	POPEU	PHEU	GDP90U	POPU	PHU	GDP90J	POPJ	PHJ
1900	805377	233731	3.45	353534	76100	4.65	65845	43850	1.50
1910	961091	254335	3.78	520936	92385	5.64	81717	49180	1.66
1920	1070588	256206	4.18	671363	106464	6.31	119809	55960	2.14
1930	1248840	271074	4.61	863349	123154	7.01	150373	64450	2.33
1940	1404918	283338	4.96	1043042	132093	7.90	265465	71930	3.69
1950	1529058	287965	5.31	1621339	151708	10.69	205969	83200	2.48
1960	2499920	315797	7.92	2233000	180671	12.36	479960	93260	5.15
1970	3999470	340349	11.75	3254400	205052	15.87	1296980	103720	12.50
1980	5358150	355225	15.08	4294500	227757	18.86	2006960	116800	17.18
1990	6742040	364525	18.50	5554100	249911	22.22	2970090	123540	24.04
1997	7527170	374151	20.12	6629500	266792	24.85	3343730	126166	26.50

Source: Guisan et al(2001), based on OECD statistics and historical statistics from several authors cited there. GDP is measured in $90 billions, Population in thousands of people and Production per inhabitant in $90 thousand per head.

Graphs 2, 3 and 4
Rates of growth of real GDP in Japan, USA and EU







3.- Cycles and causal relations between supply and demand

The analysis of economic fluctuations is interesting nowadays if we consider not only short term relations but also medium and long term relevant causes, and if we think not only about demand but also about supply, as fluctuations are generally a consequence of some imbalance in both sides of economics.

Besides this we need to use several econometric techniques for analysing causality, not only co-integration tests as this technique can be rather limited and, therefore, disappointing.

In Basu and Taylor (1999), and others cited there, some relevant issues are analysed concerning the real character of monetary shocks, the impact of real shocks due to technological change, and the roll of inflexibility of wages and prices on cyclical fluctuations. They recognise the important part supply plays in long term development although they think, as many authors do, that economic cycles are mainly explained in the short term by demand-side factors.

Perhaps during the last decades there has been an excessive concentration in economic literature on the short term, and it is our opinion that this is not entirely beneficial because very frequently, short run relationships cannot be fully understood unless we consider the main forces that account for the medium and the long term. Here, it is important to outline the important intersectoral relationships and the role of external trade. We should consider both a keynesian demand side model and the supply side perspective, as Klein(1983) has pointed out.

In a keynesian model Exports is a good variable for increasing economic growth as it expands the aggregate demand but Imports are seen as not so good because their increase, in *ceteribus paribus conditions*, that is to say without other changes in variables, implies a reduction in the aggregate level of demand. As Professor Nelson Alvarez always says the problem is really very often in the ceribus paribus condition, as in fact very often an increase in imports evokes a number of positive effects on

development with an increase both in real Gross Domestic Product, GDP, and in real Exports.

From the supply side we should imagine that imports are composed of many goods like energy, raw materials, machinery, and so on, which play an important part in the productive process like intermediate goods or capital goods. Thus when the international consequences of economic deceleration in the main economies provoke a reduction of exports from other countries, this provokes a reduction in the capacity of financing their imports and very frequently will result in internal deceleration.

As Klein (1983) has pointed out, it is very important to always include both demand and supply perspectives, and the inter-industrial and inter-sectoral relations. Very frequently though, economic authorities rely only on short-term and demand side approaches to control the negative consequences of great economic fluctuations, and use measures such as the reduction of interest rates to expand demand and to encourage investment in order to maintain a sustained level of growth rate. Sometimes, this is not enough.

Economic analysis of growth and fluctuation needs, in our opinion, more supply-side economics, and in this section we present some relationships that we think are of great interest in this sense.

Many economists and economic advisers think that increasing consumption will induce an increase in income, following a keynesian model, but reality does not always behave this way. Keynesian models account for an important half of the story but the other half depends largely on the supply side.

The analysis of causal relations in econometric applications is noteworthy but over the last few decades there been a great confusion about this important subject owing to some frequently made errors in the application and interpretation of co-integration analysis, brought about by the rigid application of this technique in many articles in economic reviews over the last two decades of co-integration analysis vogue.

Some shortcomings of cointegration techniques and other alternatives for analysing causality are shown in Guisán(2001).

The analysis of causal relations implies more than co-integration techniques. We need to understand and know economic history, integrate different economic theories and perspectives in an organised way that take into account several relevant aspects of supply and demand and we also need to estimate econometric models that compare results in different countries or circumstances.

In the next section we present some results that show the importance that industry and external trade has in explaining both economic growth and cycles from the supply side.

4.- The role of industrial production and external trade.

Imports are not only substitutes of some internal production but generally speaking they are also largely important complementary factors of production that on the whole contribute to increase the level of manufacturing and thus the level of general growth.

The consequences of insufficient growth of imports can be responsible for some constraints on the development of industrial activity and, subsequently, some constraints on the development of other sectors, mainly services to enterprises, and finally cause low growth of family income and consumption.

Industrial production plays an important role in explaining both cycles and economic growth as generally it is an advanced indicator of fluctuations as shown in Frías, Guisán and Expósito(2000), and it has a very important impact on the growth of services as shown in Guisán et al(2001).

On the other hand, in Guisán (2001) causal relations among these variables are analysed, taking into account various approaches such as Hausman causality tests, co-integration, dynamic relations, etc. Co-integration alone is generally insufficient as a

technique for analysing causality because several limitations, as stated in the aforementioned paper.

Tables 2 and 3 show the evolution of real Value-Added in manufacturing and other economic sectors, non-manufacturings, in four OECD countries: USA, Japan, Germany and Spain. There is a high correlation among both variables in all countries as the main non-manufacturing sectors are Services and Building and both depend positively on manufacturing growth.

Table 2. Value-Added in Manufacturing per inhabitant
(thousand dollars at 1990 prices and exchange rates)

	1970	1980	1990	1998
USA	2.97	3.57	4.12	5.26
Japan	2.60	4.60	7.56	8.06
Germany	4.45	5.48	6.24	5.94
Spain	1.92	2.65	3.14	3.59

Source: Elaboration from OECD National Accounts.

Table 3. Value-Added in No-Manufacturing per inhabitant
(thousand dollars at 1990 per inhabitant)

	1970	1980	1990	1998
USA	12.89	15.28	18.09	20.11
Japan	9.90	12.58	16.48	17.70
Germany	8.55	11.40	14.43	16.86
Spain	5.71	7.22	9.52	11.24

Source: Elaboration from OECD National Accounts.

The next table show the results of the estimation of an econometric model that relates real production in non-manufacturing (QNM) with real production in manufacturing(QM), during the period 1971-98. The specification of the model follows the form of a *mixed dynamic model*, which relates the level of real Valued-Added in non-manufacturing with their lagged value and the increase in the real Valued-Added in

manufacturing. The models were estimated by LS in USA, Japan and Germany, and by GLS in Spain because autocorrelation of residuals.

In all the causes the results where very good, with high goodness of fit and with all the coefficients positives and significatives, supporting the important role of intersectoral relations.

Table 4

Econometric Models of the real Value-Added of non-manufacturing

	DQM	QNM(-1)	R^2
USA	0.784 (2.9)	1.019 (299.5)	0.9953
Japan	0.388 (2.2)	1.018 (2.3)	0.9937
Germany	0.507 (4.1)	1.023 (591.9)	0.9984
Spain	0.965 (3.8)	1.021 (230.4)	0.9972

Besides that, we should have into account that the increase in manufacturing implies usually an increase in imports, because many intermediate inputs and capital goods are needed for production. The correlations indicate that both Exports and Imports of Goods are a leading indicators, which transmit fluctuations from the external trade side.

The following table, show the correlations coefficients, advanced and lagged, for Industrial Value-Added of Spain during 1972.1 1995.4 with the variables EXPG and IMPG measured at 1990 prices.

From a dynamic point of view the impact of a reduction in variables like exports of goods or services on imports contributes both from the demand side and the supply side to a reduction in the rate of growth in industry and the stagnation of manufacturing implies an important reduction in the rate of growth of services and other non-

manufacturing sectors. Through the lagged value of the variable this impact is transmitted to the next quarters and years.

Table 5

i	EXPG90(-i)	EXPG90(+i)	IMPG90(-i)	IMPG90(+i)
1	0.6861	0.6631	0.7994	0.7926
2	0.6858	0.6417	0.7916	0.7729
3	0.6864	0.6192	0.7826	0.7441
4	0.6875	0.5979	0.7724	0.7094
5	0.6873	0.5796	0.7601	0.6754
6	0.6864	0.5642	0.7461	0.6429
7	0.6862	0.5506	0.7325	0.6130
8	0.6860	0.5432	0.7198	0.5942

5.- Conclusions

For many decades the majority of macroeconomics textbooks have neglected some of the main factors of economic growth and have devoted their efforts to explaining the sources of short term imbalance, basically combining some keynesian theory and some neoclassical theory in a way named the neoclassical-keynesian synthesis, and this has had a great influence in the analysis of business cycles. This approach was insufficient in many cases not only for explaining economic growth but even for explaining some causes of economic fluctuation.

Thus we think that in the next few decades new approaches to the study of international fluctuation will arise, with more emphasis on some important real sources of growth in relation to other important variables like industrial production, external trade, education and social capital. These variables influence not only the trends in economic growth but also contribute in several ways to explain the causes of economic fluctuations.

Some important contributions to the knowledge about economic processes in the century has been the statistical data selection and analysis made by Maddison (2001), Summers and Heston(1991) and Barro and Lee(1997), as well as the publications of the

OECD Statistical Office and Education Centre and the work of the researchers on economic growth, many of which are cited in Guisán *et al* (2001) and Liesner(1984) like Feinstein, Kendrick, Kuztnets and Mitchell.

Among the main recent contributions to the clarification of the international thinking on economic growth have being the papers by Stiglitz(1998), Temple(1999) and Guisán *et al*.(2001) and (2002).

In this paper we have emphasized how important industrial production is in explaining economic growth and fluctuations as well as the role of external trade, taking into account a different approach than the usual ones, as imports are seen here as a leading indicator in many cases whose increases affect real GDP positively from the supply side.

During the 20th century EU, USA and Japan, as well as other advanced OECD countries, have experienced high rates of growth, increasing the real value of GDP by a factor higher than 9 in EU, 18 in USA and 50 in Japan from 1990 to 1997. This important economic growth was possible with very soft fluctuations during the second half of the century because several factors, including the important role of industry and external trade.

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