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RECent: c/o Dipartimento di Economia Politica, Viale Berengario 51, I-41100 Modena, ITALY
Phone +39 059 2056856, Fax +39 059 2056947, E-mail: RECent@unimore.it

Exports and Italy's economic development: a long-run perspective (1863-2004)

Barbara Pistoresi and Alberto Rinaldi[*]

Dipartimento di Economia Politica and ReCent, Università di Modena e Reggio Emilia, Viale Berengario 51, 41100 Modena, Italy

Abstract

This paper investigates the relationship between real export and real GDP in Italy from 1863 to 2004 by using cointegration analysis and causality tests. The outcome suggests that these variables comove in the long run but the direction of causality depends on the level of economic development: in the period prior to WW1 the growth of the Italian economy led that of exports, while in the post-WW2 period the causal relationship was reversed with the expansion of exports that determined the growth of the Italian economy.

JEL Code: F43; O11; N1; N7

Keywords: Export led growth hypothesis, unit root tests, cointegration analysis, Granger – causality.

[*] Corresponding author. E-mail: alberto.rinaldi@unimore.it. The authors would like to thank Giovanni Federico and Michelangelo Vasta for letting them have access to the new official series of Italian foreign trade of the Bank of Italy before they were published.

1. Introduction

The focus on the foreign exchange constraint in economic development and the role of exports as a determinant of economic growth owes much to the early contributions by Nurkse (1961), McKinnon (1964), Keesing (1967) and Kaldor (1970).
There are a number of reasons why exports should lead economic growth. Firstly, export growth directly increases the aggregate demand and then real output; moreover, by loosening the foreign exchange constraint, it makes easier to import inputs to meet domestic demand, and so enables output expansion (McKinnon 1964; Chenery and Strout 1966; Balassa 1978; Esfahani 1991).
Secondly, an expansion in exports may promote the reallocation of resources from a relatively low productivity non-export sector to a high productivity export sector. Higher productivity may in turn lead to output growth (Verdoorn 1949).
Lastly, export growth may promote the diffusion of technical knowledge (Grossman and Helpman 1991) and enhance efficiency through the international competition (Krueger, 1980). It may allow the exploitation of economies of scale if domestic markets are too small for optimal scale. All these factors may lead to higher economic growth.
However, the support for the export led growth (ELG) hypothesis is not universal and some strands of literature advocate for *growth-led exports* (GLE) or *feedback relationship* between exports and output.
For example, neoclassical trade theory states that economic growth leads to enhancement of skills and technology, with this increased efficiency creating a comparative advantage for the country that facilitates exports (Lancaster 1980; Krugman 1984). Moreover, exports may rise from the realization of economies of scale due to productivity gains; the rise in exports may in turn enable further cost reductions, which may result in further productivity gains and output increase (Helpman and Krugman 1985).
Finally, there is potential for no causal relationship between exports and economic growth when the growth paths of the two variables are determined by other unrelated variables (i.e., investment) (Pack 1988).
These different arguments on the exports-growth nexus suggested by the development and growth literature generated abundant empirical studies. However, these studies have not provided a conclusive response on the direction of causality between export and economic growth.
One reason for this lack of univocity in the results is due to the different econometric techniques that have been employed. Giles and Williams (2000a) presented a comprehensive survey of more than 150 applied papers on the relationship between exports and economic growth distinguishing between cross sections and time series approach. In general, cross section analyses find support for the ELG hypothesis, but this result is not confirmed by time series studies.[1]
The early studies consist mostly of OLS linear models (both simple and cross country regressions) in which a growth variable is regressed on an export variable. The ELG hypothesis is supported if the coefficient on the export variable is positive and statistically significant.
These regressions provide little insight into the way the various right-hand side variables affect growth and the dynamic behaviour within countries; given the possible simultaneity involved in such models the positive association is as compatible with the reverse causation in which growth promotes export (GLE hypothesis) as with ELG or feedback effects.
In addition, these models have implicitly assumed that the regression parameters are constant across countries and that the variables involved are statistically stationary. Finally, they estimates some short run dynamics between exports and growth but do not permit the estimation of long run equilibrium states.
A more recent strand of literature applies various time series techniques to examine the exports-growth nexus and avoid these potential problems with the cross-section methods. These include the

[1] See Giles and Williams (2000 b) for a discussion of the robustness of econometric methods used in these studies.

time series properties of the data used, the analysis of the long run comovement of the variables (i.e cointegration analysis), tests for causation and stability of the estimated relationships.
Another reason for the unconclusiveness of the results on ELG is due to the arbitrary division in many studies of the countries surveyed in relation to their level of development (data selection bias). This aspect concerns the existence of a difference in the effect of exports on economic growth between countries above and below some critical level of some variable, indicated as 'threshold effect'.
Several authors (Michaely 1977; Tyler 1981; Kavoussi 1984; Ram 1987; Greenaway and Sapsford 1991; Burney 1996) find that the export-growth nexus tended to be stronger in higher income economies than in low income ones. Yaghmaian and Ghorashi (1995) explain the 'threshold effect' by stressing that industrialization in developing countries begins with the gradual erosion of precapitalist modes of production. The nascent industrialization leads to an increase in total factor productivity by shifting resources from low-productivity sectors to higher productivity ones. It is only after having gained the competitive edge and cost advantage in certain products that the more competitive firms in developing countries enter the world market in search of demand for their products. In this scenario, ELG is preceded by economic development and structural change in the economy.
However, Balassa (1984) came to different results and found that, for a given increment in exports, economic growth is higher the lower is the level of development. Moschos (1989) criticized earlier studies for imposing an arbitrary division between more and less advanced developing countries. He searched for a critical switching point – which can be best found from the data themselves rather than from reference to some arbitrary criterion – below and above which the responses of output growth to its determining factors differ substantially. His results too contradict the view that among high income developing economies the effect of export expansion on economic growth is stronger than among low income ones.
A large part of the literature on ELG hypothesis analyse the casual link between export and economic growth in developing nations and in particular in East Asian newly industrializing countries. Studies on Western industrialized countries are scant (Sharma *et. al.* 1991; Ghartey 1993; Awokuse 2003, 2006; Dar and Amirkhalkhali 2003) and only a few of them deal with Italy.
In particular, there are not long run interpretations or econometric tests of the relationship between exports and Italy's economic growth from Unification in 1861 to present days. The various analyses proposed are usually concerned with single and relatively short phases of Italy's economic history and consist mainly of qualitative studies.
This paper contributes to fill this gap by investigating the causal relationship between real exports and real GDP in Italy from 1863 to 2004 by using the new official series of Italian foreign trade of the Bank of Italy.
Italy provides a classic case study for the ELG hypothesis because it is a late-comer which catched up with industrialization in the late XIX century and exhibited an excellent economic performance in the second half of the XX century that enabled it to join the G-7 group.
Hence, by adopting a time series approach we test if Italian real exports and real GDP are cointegrated, then if unidirectional or bidirectional Granger causality exists, in other words if the ELG hypothesis is supported by available data for Italy.
Our results suggest that the ELG hypothesis is confirmed only for the period 1951-2004. Conversely, in the period prior to WW1 there is evidence for GLE, that is the growth of GDP led that of exports, while in the years from 1914 to 1939 we found no long run relationship between export and economic growth. Thus, our evidence is coherent with the 'threshold effect' thesis, that is, the ELG mechanism in Italy was kicked into operation only once the economy had surpassed some level of development.
This paper is organised as follows. After this Introduction, section 2 presents a review of the literature on the role of exports in Italian economic history from Unification to the beginning of the XXI century. Section 3 presents the source ad data that we have used in our analysis. Section 4

estimates an econometric model to study the relationship between real exports and real GDP in Italy from 1863 to 2004 which makes use of cointegration analysis and causality tests. Section 5 presents a historical profile of Italian exports that helps interpret the evidence of the econometric analysis. Finally, Section 6 concludes.

1. The role of exports in the debate on Italy's economic growth

There are not long run interpretations or econometric tests of the relationship between exports and Italy's economic growth from Unification to present days. The various analyses proposed are usually concerned with single and relatively short phases of Italy's economic development and consist mainly of qualitative studies. Therefore, we present a review of the economic and historical literature on the role of exports in Italy's economic growth which is subdivided in four subsections: 1) From Unification to WW1 (1861-1914); 2) The interwar period (1919-1939); 3) The 'Golden Age' (1950-1973); 4) The last thirty years (1974-2004). Lastly, a fifth subsection surveys the econometric literature that in recent years tested the ELG hypothesis for Italy for various spans of the post-WW2 period.

2.1. From Unification to WW1 (1861-1914)

A first bulk of literature focused on the fifty years after Unification. The role of trade policies – and in particular the 1887 tariff – was the most debated topic. Large part of historiography has not criticized protectionism itself, because it was seen useful to reduce the deficit of the trade balance. The criticism, starting from the seminal work of Gerschenkron (1962), regarded the sectors chosen for protection. It was assumed that the Italian government selected the wrong activities to protect: steel, textiles and wheat instead of mechanical engineering and chemicals. Fenoaltea (1973, 2006) maintained a negative view on the tariff imposed. In particular, the tariff on wheat restricted export flows, while duties on steel prevented the development of the mechanical engineering industry, which could have become a 'real' export-led sector for the Italian economy. However, this hypothesis seems too optimistic, because a nation could not easily change its specialization which is strictly linked to its technical capabilities, which are not simple input available on the market (Vasta 1999).

One of the main interpretations of that period is the so-called Bonelli-Cafagna model, which traced back some explanations of Italy's economic growth to the beginning of the XIX century. According to Bonelli (1978) and Cafagna (1989), a long wave of growth and accumulation began early in the XIX century well before Unification, stimulated by an expansion of agricultural exports, particularly raw silk. The upswing also permitted imports of raw materials and semi-manufactured goods to increase without putting pressure on the balance of payments and exchange rates. However, the agrarian crisis of the 1880s effectively ended the key role for agriculture as Italy's export engine but, by that time, other sectors had taken up the slack and a mix of emigrant remittances and tourism helped to finance growth-induced imports.

For these two authors, because Italy was a relatively backward and resource-poor country, industrialization required massive investment in plant, equipment and modern infrastructure. Since the import content of domestic output growth was large, the problem was to find the way to ease balance of payments pressures. In this context, periods of rapid economic growth among Italy's trading partners provided an impetus for domestic expansion.

The Bonelli-Cafagna model is supported by Thornton's (1997) econometric study. This author investigates the link between export and economic growth using data on real exports and real GDP for six European countries – including Italy – from the mid-XIX century to the eve of WW1. Data for the study are taken from the compilation of European historical statistics in Mitchell (1975). The approach applied is test of cointegration as a pre-test strategy for Granger tests of causality between the two variables, while trying to control for trade liberalization proxied by the ratio of total

government revenue from import duties to total imports. The results show that, for Italy, developments in real GDP and real exports were cointegrated sharing a common trend in the long run, and indicate unidirectional Granger-causality from real exports to real GDP. Thus, according to this study, the expansion of exports was a leading contributor to Italy's economic growth in that period.

However, according to Fenoaltea (1988a, 2006), who provided new estimates of Italy's investment and GDP from the Unification to WW1, the Italian economic growth must be seen in another perspective. This author explains growth and fluctuations in Italy by establishing a link between the Italian investment cycle (and economic growth) and parallel movements overseas. He argued that swings in Italian construction and in other activities were strictly supply-induced, driven by fluctuations in British capital exports that were, in turn, determined by investor sentiment in Britain. Fenoaltea proposed a financial business cycle model in which domestic economic activity was linked to international capital flows. His point was that Italy's investment cycle was essentially part of that of the financial periphery of the world economy.

So, if in the Bonelli-Cafagna view Italy's balance of payments and the international value of the lira were determined by trade flows which functioned as a constraint to economic growth, Fenoaltea argued that Itay's balance of payments and exchange rate were a function of international capital flows. As a consequence, he held that the usual contention that Italy's growth rate was constraint by balance of payments consideration is invalid. It does imply that Italy's growth depended at least in part on decisions of international investors over whom Italy had relatively little control.

This result seems in line with the econometric study by Crivellini (1993), who shows that after 1861 the contribution of exports to GDP growth was modest. However, his results remain highly tentative. There is no explicit testing of alternative hypotheses, and the econometric methods imply very strong assumptions about the exogeneity of the explanatory variables. For instance, Crivellini goes as far as assuming that not only exports but also investments and agricultural output were exogenous (Federico 1996).

2.2. The interwar period (1919-1939)

The debate on the role of exports for Italy's economic growth in *the interwar period* is not so rich. After a short recovery in the 1920s, international trade collapsed in the 1930s as a consequence of the Great Depression and return to protectionism all over in the world. Thus the role of exports was not emphasized in the analysis of Italy's economic development at that time.

2.3. The 'Golden Age' (1950-1973)

Conversely, the debate on the role of exports as a determinant of Italy's economic growth is particularly rich with regard to the years of the 'Golden Age' (1950-1973). Some authors (Stern 1967; Graziani 1969, 1998) maintained that the growth of the Italian economy was export-led at that time, although there is less agreement on exactly how exports drove the growth process. In one version, an increase in international demand for goods in which Italy had a comparative advantage induced producers to increase investment in plant and equipment and to expand output. As e result of the enlarged market, they achieved scale economies and became competitive internationally. With slack in the economy, at least initially, it may have been possible to increase output with no increase in costs or prices.

In particular, Graziani (1969, 1998) argued that for a developing nation poor of raw materials and of modern production technology such as Italy, the capacity to import was the major constraint to growth. Thus, Italy needed to boost exports to ease balance of payments pressures. On that purpose, Italy had to acquire a competitive advantage in those industries for which international demand was particularly fast-growing. That was the case of manufactured products and in particular of durables, such as furniture, cars, and electric appliances. The growth of the export sector in turn led to industrial dualism as the export sector – that used capital-intensive technology, had higher

productivity and paid higher wages – met the demand of foreign consumers whose per capita income was much higher than that of Italian ones. The latter could not afford the durables that were manufactured for exports and still demanded mostly primary goods, such as housing and foodstuffs, which were supplied by local producers that used labour-intensive technology, had lower productivity and paid lower wages.
However, other scholars have rejected – or at least reconsidered – the ELG hypothesis by maintaining that the internal demand was the driving force of the economic growth at least in the first years of the Golden Age (Ciocca, Filosa and Rey 1975; Zamagni 1992; Battilani and Fauri 2008).
In particular, Ciocca, Filosa and Rey (1975) argued that, among other things, the timing of Graziani's argument is wrong. The rapid expansion of exports post-dated the first phase of the high-growth period by almost a decade. Even among those products that experienced very fast export growth for much of the period, such as textiles, rubber goods and transportation equipment, the share of exports in total sales increased only for transport equipment. They argue further that Italy did not face a balance of payments constraint, since the growth of international trade was matched by the growth of internal demand for domestically produced goods and service. These authors maintain that government demand was the engine of growth between 1950 and 1957.
The situation changed *after 1958*, with the creation of the EEC. Trade liberalization accelerated, export growth exceeded even the blistering pace set by GDP expansion, merchandize exports outstripped tourism and emigrant remittances for the first time, and investment in machinery and equipment surpassed capital accumulation in agriculture and construction (Ciocca, Filosa and Rey 1975).
Zamagni (1992) stressed that exports expanded not only for new products such as durables but also for traditional ones such as clothing and garment and, more generally, that the role of exports in the growth of Italian industry in the years of the Golden Age must not be overplayed.

2.4. The last thirty years (1974-2004)

By contrast, the literature on the last three decades mainly focused on the structure of Italian trade and, in recent years, is becoming strictly linked to the debate on the so-called Italian 'economic decline' in the beginning of the XXI century (Gallino 2003; Visco *et al.* 2004; Vasta 2010). The rapid decrease of Italy's share on world exports represents, according to this strand of literature, one element of this decline. At the same time, the specialization of Italian exports appears too much oriented towards low-technology traditional goods. Various analyses have shown that Italian specialization is both highly concentrated in sectors with slower rate of growth in the world markets and has become more similar to that of newly developing countries (Onida 2004; De Nardis and Traù 2005). However, other studies give a less negative interpretation of the structure of Italian exports over the last 30 years. Although Italy's export specialization is largely in traditional goods, the country was able to resist competition from developing countries by shifting towards higher quality goods within the same sectors of specialization (Lanza and Quinteri 2007).

2.5. The econometric tests on the ELG hypothesis for Italy in the post-WW2 period

The first econometric studies that tested the ELG hypothesis for Italy in the post-WW2 period appeared only in the 1990s, with contrasting results.
Sharma *et al.* (1991) investigated causal relationship between real GDP growth, exports and factor inputs (capital and labour) in five industrialized countries, among which Italy. They used quarterly data for the period 1960-87 to analyse a four-variable vector autoregressive (VAR) model for each country. No casual relationship between export and GDP growth was observed for Italy, while capital was prima facie the only variable that caused growth of output.
A similar result was obtained by Pomponio (1996) who examined both bivariate causal relationship between nominal manufactured export and manufactured output growth and trivariate causal relationship between nominal manufactured exports, investment, and manufactured output for 66

OECD and less developed countries – including Italy – in the period from 1965 to 1985. Annual data were used. Before the causality testing, integration and cointegration processes were tested in order to select the appropriate functional form. The causality testing process employed a VAR approach. Both the bivariate and the trivariate analysis found no causal relationship between exports, output and investment for Italy.
Riezman *et al.* (1996) performed bivariate and trivariate Granger causality tests on the 126 countries – among which Italy – included in the purchasing power index dataset of Summers and Hesston (1991) for the years from 1950 to 1990. These authors hold that failure to account for the role of import growth can produce misleading results in the analysis of the relationship between export and income growth. They presented two alternative methods of measuring the export-GDP relationship, which allow to control for the effect of imports: the forecast error variance decomposition (FEVD) and the measure of conditional linear feedback developed by Geweke (1984). As far as Italy is concerned, bivariate results showed no causality between export and GDP growth, while trivariate results supported the export-led growth hypothesis.
A recent work by Federici and Marconi (2002) tests the ELG hypothesis for the Italian economy from 1960 to 1998 by using cointegration analysis. The authors develop a VAR model with four macroeconomic variables: an index of the OECD countries' GDP; the Italian lira's real exchange rate; Italy's quarterly data on real exports and real GDP. Their results provide clear support for the hypothesis. In particular, exports are a significant determinant of both short-run and long-run fluctuations of the Italian economy.

2. Sources and data

In 1957, Italy's Central Statistics Institute (Istat) published annual estimates of the country's historical national accounts for the period 1861-1956. These estimates included a detailed reconstruction of both production side and expenditure side at current prices, and of the latter alone at constant (1938) prices; 1938-price product series were also provided for core agriculture (cultivation and herding) and for manufacturing industry (Istat 1957). However, this work lacked key series (such as output by sector at constant prices), details on methodology and sources, and an appropriate degree of scepticism about official statistical sources (Cohen and Federico 2001).
A first attempt to improve on the Istat estimates was made a decade later by a team of scholars led by the economist Giorgio Fuà. The team's contributions included estimates of value added by sector at constant (1938) prices, implicit deflators by sector and use, and the creation of a comprehensive series on the capital stock from 1881 onwards (Ercolani 1969; Fuà 1965, 1969; Vitali 1969). Yet, the Fuà team did not attempt to rebuild the core of the work by Istat: the estimates of value added at current prices. It is for this reason that many scholars, troubled by flaws in the original data, remained unconvinced by this revision (henceforth referred to as the Istat-Fuà series).
Anyway, in the absence of any other estimates of Italy's national accounts, the Istat-Fuà series were included in all international collections of historical statistics (i.e., Mitchell 1975) and were used by Thornton (1997) in his study on the link between exports and economic growth for six European countries from the mid-XIX century to the eve of WW1.
Meanwhile, some scholars started to present new revised series for individual sectors and industries. Fenoaltea built new estimates of industrial production for the 1861-1913 period (Fenoaltea 1967, 1972, 1982, 1987, 1998b, 1988c, 2003), while a separate index of industrial production from 1861 to 1980 was put together by Carreras (1983, 1992, 1999).
In the early 1990s Maddison (1991) presented a new estimate of Italy's GDP. Maddison used Istat-Fuà series for agriculture and services and industrial series by Fenoaltea (Fenoaltea 1967, 1982, 1987, 1988b, 1988c), In this fashion Maddison noticeably increased the overall growth rate of Italy's GDP: his series increases between 1861 and 1913 by a factor of 2.5, against just 2.1 for the

Istat-Fuà estimates. Nonetheless, this series remained dominated by the Istat components, and apart from a trend correction its path remains extremely close to that of the Istat-Fuà aggregate.
The criticism of the Istat-Fuà series was so widely accepted that an overhaul of the historical accounts was among the projects sponsored by the Bank of Italy in view of its centenary in 1993. The Bank of Italy's project led initially to the re-estimation of aggregate product at current prices in 1911 (Rey 1992). These estimates were retouched almost a decade later, when parallel current-price estimates were compiled for 1891, 1938, and 1951 (Rey 2000).
The Bank of Italy's team aimed also at re-estimating the time series of agricultural, industrial and service production. As this part of the project was not carried through, members of the team published independently each from the other the results of their sectoral value-added estimates.
Thus Fenoaltea presented a preliminary index of industrial value added for the years 1861-1913 at 1911 prices, obtained by adding to the numerous sector-specific series he had compiled over the decades a set of preliminary estimates for the remaining sectors (Fenoaltea 2002a, 2002b, 2003). Soon thereafter Federico published his preliminary estimates of agricultural production from 1860 to 1910, again at 1911 prices (Federico 2003).
Finally, Fenoaltea (2005, 2006) presented new estimates of GDP in Italy from 1861 to 1913 at 1911 prices: the first not to recombine the component series of the original Istat-Fuà estimates. The new GDP series incorporated Federico (2003) series for agriculture, Fenoaltea (2003) series for industry, and a newly derived series for services that extrapolate the Bank of Italy estimates of their value added in 1911 (Rey 2000).
This new Fenoaltea series is now considered as the more accurate estimate of Italy's annual GDP for the years from Unification to the eve of WW1 and has been used in some recent empirical works (Ciccarelli and Fenoaltea 2007; Federico and Vasta 2010). We also use it in this paper.
Instead, the Istat-Fuà estimates of Italy's annual GDP for the years from 1914 to 1939 have never been revisited and are at present the only data available on that period. So we use them in this paper in the version published by Ercolani (1969).
After 1957, Istat updated its current GDP estimates to account for the so-called grey markets, that is, economic activities that were not recorded in official data. However, Istat tied them in with its previous series back only to 1970. Fortunately, Golinelli and Monterastelli (1990) produced a coherent series of national income data from 1951 to 1989, based on the more recent Istat revisions available at that time.
Thus, for the period after 1951, we use the GDP data provided by Golinelli and Monterastelli (1990) for the years from 1951 to 1969, and Istat's more recent estimates for the years from 1970 to 2004. Our analysis stops in 2004 as since 2005 Istat changed the methodology it used to calculate real GDP by passing from fixed-base to chain indexes. Data are in 1990 prices.[2]
As to the data on exports, for the period from 1863 to 1939 we use the series of new comprehensive statistics of the Bank of Italy that is based on the very detailed official sources of Italy's foreign trade (*Movimento commerciale del Regno d'Italia*). This series constitutes the new official statistics of Italy's foreign trade for the period prior to WW2. This new source calculates real exports by using a specific deflator for export goods which is different from the GDP deflator that is used to calculate real exports in the Istat-Fuà series used by Thornton (1997)[3].
For the period from 1951 to 2004 data on exports are taken from OEEC, *Foreign trade series*, for the years 1951-1961, and from United Nations, *UN Comtrade*, for the period from 1962 to 2004. Also in this case a specific deflator for export goods is used to obtain real exports.
Finally, as no reliable data on Italy's exports are available for the 1940-1950 years, this period has been omitted from the analysis. Thus, this paper tests the ELG hypothesis for Italy by focusing on two separate time spans: 1863-1939 and 1951-2004.

[2] Italy's GDP data at 1990s prices from 1951 to 1996 are published in Di Palma and Carlucci (1997). For the years from 1997 to 2004 we have relied on Istat's official publication *Annuario statistico italiano*.
[3] Some preliminary data drawn from these series have been used in Federico and Vasta (2010) and Vasta (2010).

3. The Empirical Model

The export-GDP nexus is a long run relationship whose analysis requires techniques appropriate for estimating long run equilibrium. A statistical test of a long run relationship must take into account the characteristics of time series data. These data should be tested for comovement over time prior to test for causality between them.
Hence, in this section by adopting a time series approach we test if Italian real export and real GDP are cointegrated, then if unidirectional or bidirectional Granger causality exists, in other word if the ELG hypothesis is supported by available data for Italy.

3.1. Granger causality and cointegration

In the case of time series data a test for the direction of causation is suggested by Granger (1969). A variable X improves the prediction of a variable Y, that is X Granger causes Y, if current Y can be predicted better by using past values of X than by not doing so, given that all other past information in the information set is used. Suppose X and Y are linear *covariance stationary* time series[4]. Thus X and Y can be written as follows:

$$(1)\quad X_t = \sum_{i=1}^{m} a_i X_{t-i} + \sum_{j=1}^{n} b_j Y_{t-j} + \varepsilon_t$$

$$(2)\quad Y_t = \sum_{i=1}^{m} c_i Y_{t-i} + \sum_{j=1}^{n} d_j X_{t-j} + u_t$$

where ε_t, u_t are zero mean and finite covariance matrix random vector. The *causality test* is

a) X causes Y if $H_0 : d_j = 0, j = 1,...,n$ is rejected
b) Y causes X if $H_0 : b_j = 0, j = 1,...,n$ is rejected

Bidirectional causality occurs if both (a) and (b) hold. Unidirectional causality from X to Y occurs if (a) holds but (b) does not. In order to test these null hypothesis in (a) and (b), F statistics are calculated for jointly significance of the d_j in equation (1) and for b_j in equation (2).

For the Granger causation test, the hypothesis of covariance stationarity of the time series used is crucial to avoid spurious results. In general, the levels of the time series are not covariance stationary while their first difference are stationary. The growth rate of these variables (ΔX and ΔX) are stationary, while X and Y are not. If these are the statistical properties of the variables, we can only test for Granger causation by using first difference stationary models, that is

$$(3)\ \Delta X_t = \sum_{i=1}^{m} a_i \Delta X_{t-i} + \sum_{j=1}^{n} b_j \Delta Y_{t-j} + \varepsilon_t$$

$$(4)\ \Delta Y_t = \sum_{i=1}^{m} c_i \Delta Y_{t-i} + \sum_{j=1}^{n} d_j \Delta X_{t-j} + u_t$$

[4] Time series are said to be covariance stationary if their moments up to the second order do not depend on time. Hence, for instance the mean must be constant and the shocks affecting stationary series have only temporary effects. These time series are also said I(0). By contrast a series is said to be difference stationary if its first difference is stationary but the series itself is not. A property of difference stationary series is that they do not have necessarily constant means and the variance grows with time without limit, moreover the shocks affecting them are permanent. These series are also said I(1).

However, the exports-GDP nexus is a long run relationship. If this long run nexus exists but we do not include it in the estimation of model (3) and (4) we have mis-specification and 'spurious causality'. Hence, we have to test for Granger causation, to take into account the possible long run relationship among *the levels (values)* of exports and GDP and not only among the short run dynamics of export and GDP growth. Granger type causality tests for a long run relationship are valid if the relevant variables are found to be *cointegrated*, that is they move together so closely over the long run that they share a stochastic (and possibly also deterministic) trend in common. In this latter case as stressed by Granger (1988) there is a presumption for causality to run in at least one direction.
Suppose X is the Italian real exports (*in logs*) and Y is the Italian real GDP (*in logs*). Moreover suppose these series are not covariance stationary, but they are cointegrated co-moving over time. In this case Granger causality test, as in point (a) and (b) stated before, must be performed on the following ECM models:

$$(5)\ \Delta X_t = \sum_{i=1}^{m} a_i \Delta X_{t-i} + \sum_{j=1}^{n} b_j \Delta Y_{t-j} + \delta ECT_{t-1} + \varepsilon_t$$

$$(6)\ \Delta Y_t = \sum_{i=1}^{m} c_i \Delta Y_{t-i} + \sum_{j=1}^{n} d_j \Delta X_{t-j} + \gamma ECT_{t-1} + u_t$$

where ECT is the error correction term derived by cointegration analysis representing the long run equilibrium among the variables.
To conclude, the causality testing procedure involves three steps. The first step is to test if real exports (in logs) and real GDP (in logs) are not covariance stationary (*integration analysis*). If the variables are not stationary, the second step is to *test for cointegration* using Johansen (1991) multivariate procedure to check for a common trend. As shown by Kremers et al. (1992) this procedure is currently the most reliable test for common trends. Finally, if cointegration exists, then either unidirectional or bidirectional *Granger causality* must exist in at least the stationary variables and causality F-test must be performed on the ECM models above.

4.2. Integration and cointegration analysis

Before testing for causality we check for stationarity by using Dickey Fuller tests (ADF) for the levels and first differences of the variables. We also use tests with stationarity as null (KPSS test) to confirm the results of the usual Dickey Fuller tests of non stationarity. If both reject their nulls then we have no confirmation, but if test ADF rejects the null but test KPSS does not (or viceversa) we have confirmation (see Table 1).

Table 1 – Tests and confirmation analysis

Test ADF (Dickey Fuller)*	**Test KPSS****
$H_0 : y_t$ non stationary series (unit root)	$H_0 : y_t$ stationary series (no unit root)
$H1 : y_t$ stationary series	$H1 : y_t$ non stationary series (unit root)

Notes: * see, Dickey Fuller (1979). ** see, Kwiatkowski, Phillips, Schmidt e Shin (1992).

Table 2 summarises the non stationary results for the period 1863-1939, while Table 3 shows the corresponding results for the period 1951-2004. Both ADF and KPSS depend on a parameter (*k* or *w*) which must be chosen in advance depending on the autocorrelation structure of the data: we write ADF(*k*) and KPSS (*w*), where *k* indicates the lags while *w* the window sizes. We apply both

ADF and KPSS for different values of *k* and the KPSS for different *w*. Other details on these tests are in the Notes of the tables.
As shown in Tables 2 and 3, for real exports and real GDP *in levels*, stationarity is rejected with different KPSS window sizes and the non stationarity is not rejected with different lags of the ADF. For the *first differences* of the variables the vice-versa holds. We conclude that real exports and real GDP are non stationary series, while their growth rates are stationary in both samples.
The next step is to test for cointegration to check for a common trend in export and GDP. The Johansen's maximum likelihood method (Johansen 1991), using the Maximum Eingenvalue and Trace statistics, finds no cointegration on the period 1863-1939, while it suggests a significant long run relationship between exports and GDP on the sub-sample 1863-1913, that is excluding the WW1 years and the collapse of international trade in the 1930s following the Great Depression. Cointegration is also the outcome for the period 1951-2004. Such results are robust to varying the length of the model. The statistics of Johansen's cointegration analysis for a VAR with three lags are presented in Table 4, as suggested by information criteria.
If exports and GDP are cointegrated, Granger causality test must be performed on the coefficients of VECM models as described by equations (5) and (6) above. In our case, two ECM models with two lags are estimated and the results of the F-statistics for the conditions (a) and (b) above are presented in Table 5. The F-statistics on the coefficients of GDP growth and export growth are significant. The causal inference between exports and GDP growth is summarized in the last column of the Table. The results suggest that the ELG hypothesis is confirmed only for the period 1951-2004, while in the period 1863-1913 there is evidence for GLE, that is the growth of GDP caused that of exports.
If cointegration is rejected, suggesting no long run comovements among exports and GDP, in the period 1914-1939, it is possible to analyse short run comovements among these variables and test for Granger causation by using the first difference stationary models (3) and (4). However, the turmoil due to WW1 and to the consequences of the Great Depression in the 1930s induced parameter instability and some significant structural breaks in the time series[5]. Because of this parameter instability we do not perform causality tests on the period 1863-1913.
Thus, on the basis of such results we conclude that exports and GDP are generally cointegrated and therefore casually related. In particular, in the years prior to WW1 we find an unidirectional Granger-causality from real GDP to real exports which is just the reverse of the result obtained by Thornton (1997) for the same period. Such a circumstance is due to the fact that we use new and more accurate estimates of both exports and GDP and, above all, to the different methodologies used to estimate real exports. In fact, Thornton (1997) derives not only real GDP but also real exports by using the same GDP deflator, which increases the co-movement of the two aggregates. On the contrary, we derive real exports by using a specific export goods deflator with the consequence of reducing the co-movement of the two variables.
Conversely, for the post-WW2 period we find that the expansion of exports prompted the growth of GDP. This result contrasts with the outcome of the first tests of the ELG hypothesis for Italy by Sharma *et al.* (1991) and Pomponio (1996), but is in line with Riezman *et al.* (1996) trivariate Granger causality test and with Federici and Marconi (2002) test of ELG for the Italian economy from 1960 to 1998.
However, our model cannot contribute to the debate on the timing of the ELG in the years of the Golden Age. In fact, we find no evidence to either support or reject Ciocca, Filosa and Rey (1975) argument that the rapid expansion of exports post-dated the first phase of the GDP high-growth period by almost a decade and the creation of the EEC in 1958 was the real turning point that enabled Italy to set in motion the ELG mechanism. What we can argue is that in the long run Italy's economic growth after WW2 was export-led.

[5] QLR test for a break at unknown date on models (3) and (4) suggest a significant break in 1917 and in 1920. The outcome for the QLR statistics is: F(4,17) = 5.98 for 1917 and F(4,17) = 4.96 for 1920. In both cases the null of no break is rejected. Critical values in Andrew (2003).

Table 2 Integration analysis, 1863-1939

Variable (levels): Real GDP (logs)#					
Non stationarity tests: ADF			**Stationarity tests: KPSS**		
ADF(0)	-3.29	Not reject the null of non stationary series	KPSS(0)	0.24	Reject the null of stationary series
ADF(1)	-3.80^	Not reject the null of non stationary series	KPSS(1)	0.14	Reject the null of stationary series
ADF(4)	-2.51	Reject the null of non stationary series	KPSS(4)	0.09	Not reject the null of stationary series
Variable (first differences): Δ Real GDP (logs)*					
Non stationarity tests: ADF			**Stationarity tests: KPSS**		
ADF(0)	-8.01	Reject the null of non stationary series	KPSS(0)	0.04	Not reject the null of stationary series
ADF(1)	-6.83	Reject the null of non stationary series	KPSS(1)	0.03	Not reject the null of stationary series
ADF(4)	-4.39	Reject the null of non stationary series	KPSS(4)	0.06	Not reject the null of stationary series
Variable (levels): Real Export (logs)#					
Non stationarity tests: ADF			**Stationarity tests: KPSS**		
ADF(0)	-2.62	Not reject the null of non stationary series	KPSS(0)	0.64	Reject the null of stationary series
ADF(1)	-3.10	Not reject the null of non stationary series	KPSS(1)	0.35	Reject the null of stationary series
ADF(4)	-3.52^	Not reject the null of non stationary series	KPSS(4)	0.18	Reject the null of stationary series
Variable (first differences): Δ Export (logs)*					
Non stationarity tests: ADF			**Stationarity tests: KPSS**		
ADF(0)	-7.95	Reject the null of non stationary series	KPSS(0)	0.05	Not reject the null of stationary series
ADF(1)	-7.09	Reject the null of non stationary series	KPSS(1)	0.05	Not reject the null of stationary series
ADF(4)	-3.61	Not reject the null of non stationary series	KPSS(4)	0.06	Not reject the null of stationary series

Notes: # Model with constant and trend included: the 95% critical values for the ADF tests is -3.5 and the 99% is -4.15. The 95% critical values for the KPSS tests is 0.14. * Model with constant included: the 95% critical values for the ADF tests is -2.93 and for the KPSS tests is 0.46. ^ do not reject the null of non stationary series at the 1% significance level. For the ADF tests see Fuller (1976) and for the KPSS tests Kwiatkowski, Phillips, Schmidt e Shin (1992).

Table 3 Integration analysis, 1950-2004

Variable (levels): Real GDP (logs), I(1)					
Non stationarity tests: ADF			**Stationarity tests: KPSS**		
ADF(0)	-2.54	Not reject the null of non stationary series	KPSS(0)	1.39	Reject the null of stationary series
ADF(1)	-1.72	Not reject the null of non stationary series	KPSS(1)	0.68	Reject the null of stationary series
ADF(4)	-2.58	Not reject the null of non stationary series	KPSS(4)	0.30	Reject the null of stationary series
Variable (first differences): Δ Real GDP (logs), I(0)					
Non stationarity tests: ADF			**Stationarity tests: KPSS**		
ADF(0)	-7.27	Reject the null of non stationary series	KPSS(0)	0.12	Not reject the null of stationary series
ADF(1)	-4.95	Reject the null of non stationary series	KPSS(1)	0.11	Not reject the null of stationary series
ADF(4)	-4.40	Reject the null of non stationary series	KPSS(4)	0.13	Not reject the null of stationary series
Variable (levels): Real Export (logs), I(1)					
Non stationarity tests: ADF			**Stationarity tests: KPSS**		
ADF(0)	-1.22	Not reject the null of non stationary series	KPSS(0)	1.22	Reject the null of stationary series
ADF(1)	-0.45	Not reject the null of non stationary series	KPSS(1)	0.63	Reject the null of stationary series
ADF(4)	-2.28	Not reject the null of non stationary series	KPSS(4)	0.28	Reject the null of stationary series
Variable (first differences): Δ Export (logs), I(0)					
Non stationarity tests: ADF			**Stationarity tests: KPSS**		
ADF(0)	-6.75	Reject the null of non stationary series	KPSS(0)	0.11	Not reject the null of stationary series
ADF(1)	-5.02	Reject the null of non stationary series	KPSS(1)	0.11	Not reject the null of stationary series
ADF(4)	-2.51	Not reject the null of non stationary series	KPSS(4)	0.10	Not reject the null of stationary series

Notes: The 95% critical values for the ADF tests is -3.50 (constant and trend included), Fuller (1976). The 95% critical values for the KPSS tests is 0.14 (trend included), Kwiatkowski, Phillips, Schmidt e Shin (1992).

Table 4 The results of Johansen's cointegration procedure (maximum lag in the VAR =3)

		1863-1939	
Rank	Eigenvalues	Statistics: Trace	Statistics: λ-max
0	0.12	10.53	10.08
1	0.005	0.45	0.45
		1863-1913	
Rank	Eigenvalues	Statistics: Trace	Statistics: λ-max
0	0.33	20.66*	19.37*
1	0.02	1.29	1.29
		1950 – 2004	
Rank	Eigenvalues	Statistics: Trace	Statistics: λ-max
0	0.40	29.45*	27.34*
1	0.04	2.11	2.11

Notes: The variables under consideration seem to follow a linear trend then we use a VAR with any restriction on the constant. Critical values for this case in Osterwald-Lenun (1992: Table 1.1*, unrestricted constant). The 95% critical values for Trace are: 17.95 and 8.18, while for λ-max are: 14.90 and 8.18. An asterisk indicates significance at the 5% level. The statistics are from a VAR(3), as suggested by information criteria. However, the results are robust to varying the length of the VAR.

Table 5 Granger causality tests, (maximum lag in the VECM =2)

	Export growth (Y) on GDP growth (X)		GDP growth (Y) on Export growth (X)		
Sample	**F test**	**Results**	**F test**	**Results**	**Casual inference**
1863-1913	F(2, 42) = 2.71* (p-value = 0.07)	Reject H_0	F(2, 42) = 0.35** (pvalue = 0.70)	Fail to reject H_0	GDP causes Export
1950-2004	F(2, 46) = 1.68 ** (p-value = 0.19)	Fail to reject H_0	F(2, 46) = 3.52** (pvalue = 0.037)	Reject H_0	Export causes GDP

Notes: H_0 is the null that X does not cause Y. ** significant at the 5% level, * significant at the 1% level . The statistics are from a VECM(2), because the cointegration analysis is based on a VAR(3).

5. A historical profile of Italian exports

This section presents a historical profile of Italian exports that helps to interpret the results of the econometric test. At the moment of Unification in 1861 Italy was a mainly agricultural country. In that year agriculture accounted for 64 per cent of the working population and 48 per cent of the nation's GDP (Balcet 1997; Fenoaltea 2005). The school system was underdeveloped and the literacy rate did not exceed 25 per cent. The Italian government in the 1860s and 1870s did not provide any support to industrialization. This entailed a relevant discontinuity with the pre-Unification states, which had tried to foster their ailing industries with tariffs and sometimes incentives, even if with disappointing results. Actually, most states (save the Southern Kingdom of the Two Sicilies) had begun to liberalize trade before Unification. The movement was led by Piedmont which almost totally abolished protection in the 1850s. In 1861 its tariff was extended to the whole country and all the remaining duties were abolished two years later by the trade treaty with France (Federico and Giannetti 1999).

Thus, the first 25 years or so after Unification saw a growth of Italian real exports which more than doubled from 1863 to 1887 (from 538 to 1,161 billion lire at 1911 prices) with an average increase of 3.25 per cent a year (see Figure 1). At that time, primary products were largely dominant and represented about 85 per cent of the total flows. Among them, raw silk stood out with about one third of Italy's total exports (Vasta 2010).

However, Italy's economic growth in the two decades that followed Unification was decidedly inferior than expected. This reinforced the arguments of those who, inside the nation's elite, voiced for a more interventionist policy. So in 1878 the government approved a new tariff which imposed low duties on a limited range of manufactured goods (mainly textiles). The protection was substantially increased in 1887, which was approved jointly with a duty on wheat. The new tariff increased the duties on textiles and imposed a new duty on sugar, pig iron and steel products (Federico and Giannetti 1999).

The 1887 tariff triggered a trade war with France (at that time, Italy's larger trade partner) which lasted ten years. As a consequence, from 1888 to 1890 Italian exports fell by almost a fifth (see Figure 1).

The level of aggregate protection peaked in the early 1890s and then decreased until at least the second decade of the 20th century, because the specific duties were reduced by trade treaties and their *ad valorem* equivalent was lowered by the increase in import prices (Federico and Giannetti 1999). Thus, in 1891 Italian real exports returned to grow and reached a peak of 2,500 billion lire in 1913, with an average growth rate of 4.25 per cent a year over the 1891-1913 period (see Figure 1). These were the years of the first wave of industrialization in Italy which turned out to be buoyant to exports too (Roccas 2003).

The 15 years or so that preceded WW1 also saw the beginning of a change in the composition of Italian exports. In fact, at the eve of the war the share of primary products had fallen to 64 percent and, within them, raw silk had dropped to 18 per cent. Conversely, the share of manufactured goods had risen from 15 per cent in 1861 to 36 per cent in 1913: among them, textiles (silk fabrics and cotton fabrics), machinery and transport equipment stood out (Vasta 2010).

The ratio of real exports to real GDP was just above 5 per cent in 1863. In the following twenty years it showed many ups and downs within a general trend of growth which led it to reach 8.4 per cent in 1883. Then a swing brought it down to 6.5 per cent in 1890. Since 1891 it returned to grow and reached 11 per cent in 1906, a value around which it remained until the outbreak of WW1 (see Figure 2).

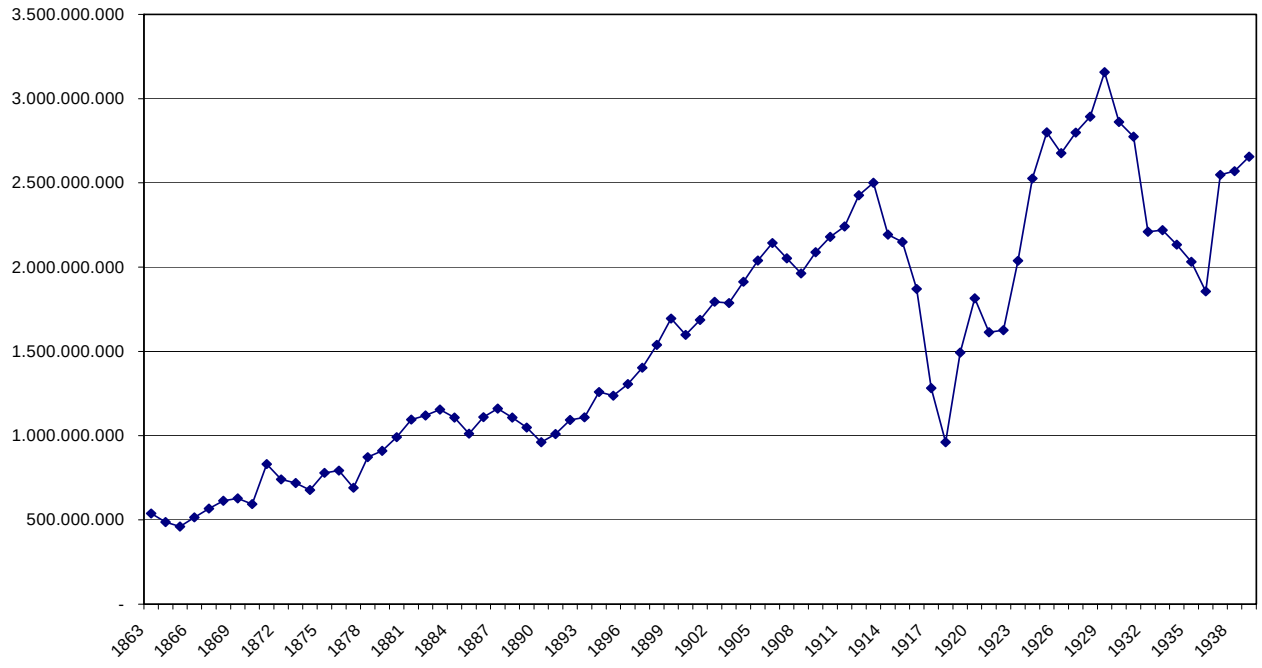
These figures suggest that – contrary to the Bonelli-Cafagna view – the size of the exporting sector of the Italian economy was too small and did not grow fast enough to trigger ELG before WW1. Moreover, the leading exporting sectors were those that produced primary goods – especially raw

silk – which were not sophisticated enough to generate technological spillovers that could translate into a higher innovation capacity and more rapid growth of the whole economy.[6]

Fortunately, the constraint on the balance of payments exerted by such a limited capacity to export was eased by some important items which contributed towards offsetting Italy's trade deficit: capital inflows from abroad, tourism and the remittances of Italian emigrants. Earnings form tourism always constituted a positive item in the Italian balance of payments, while only after 1900 were emigrants' remittances substantial enough to balance the negative flow of income from foreign capital investment in government bonds and private enterprise. As a result, the overall balance of payments showed no sign of a structural imbalance which might have curbed economic growth (Zamagni 1993).

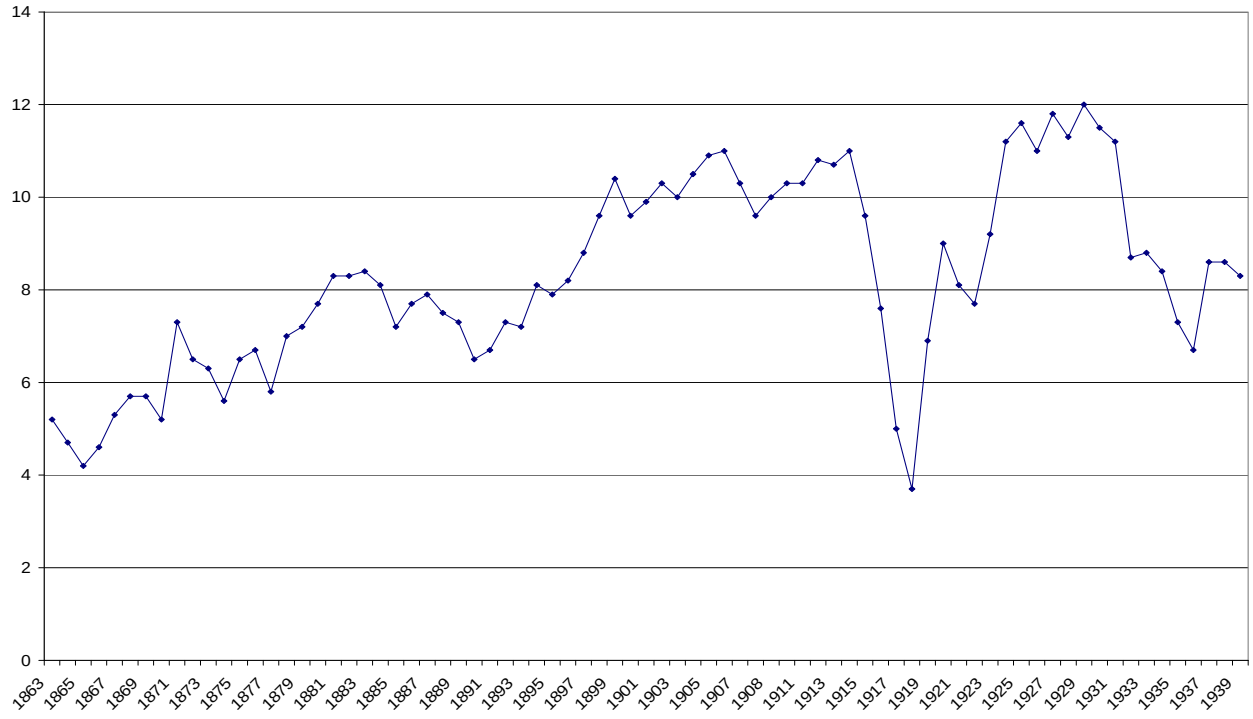
Conversely, our evidence seems more in line with Fenoaltea's (1988a, 2006) thesis that links Italy's economic growth to international capital inflows: the decisions of international investors boosted investments in constructions, infrastructures, industry, and public utilities in Italy which induced economic growth. More modern plants and higher production capacity in turn prompted Italy's capacity to export.

Fig. 1. Italian exports 1863-1939 (1911 prices)



[6] Federico (2005) argues that raw silk might have been a leading sector in the smaller State of Lombary-Veneto prior to the Unification but agrees that after 1861 it was too small to lead the growth of the whole Italian economy.

Fig. 2. Ratio of exports to GDP in Italy (1863-1939)



Similarly to most other countries of the European periphery in the late 19th century, Italy used the capital inflows from the core countries to prompt import-substitution industrialization in capital intensive sectors – in particular steel and heavy mechanics – rather than pursue ELG in sectors in which it could have a competitive advantage in the world market. The fall of prices of the goods that were traded in international markets, together with the stabilization of exchange rates that was made possible by foreign loans were all factors that pushed nations towards protectionism to defend domestic infant industries (De Cecco 2003).

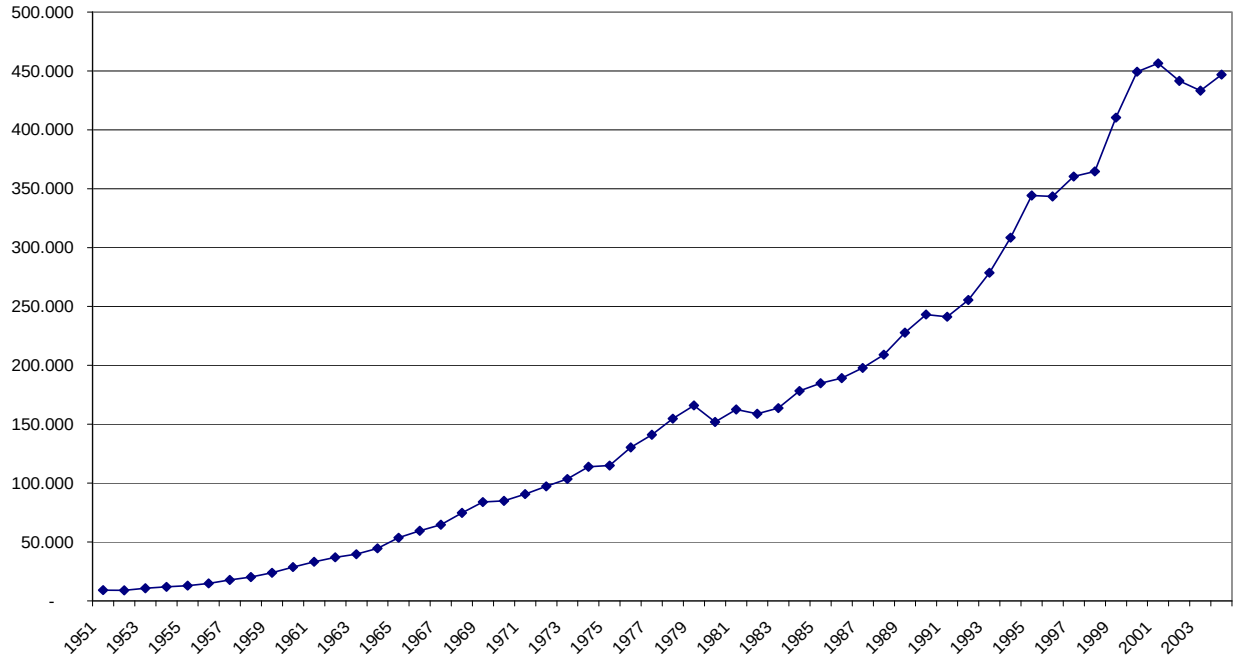
During WW1 exports more than halved and their share of Italy's GDP fell sharply as well since all the resources available in the national economy were mobilised to sustain the war effort (Federico 1998). Once the post-war re-conversion was completed in the early 1920s, exports recovered quickly and reached a peak in 1929 when they accounted for 12 per cent of national output.

However, international trade collapsed in the 1930s as a consequence of the Great Depression and a return to protectionism became a generalized practice all over in the world. Italian exports were severely affected by these events and both their value and share of national GDP fell dramatically in that decade.

The layout of Italy's industrial protection changed somewhat in 1921, when a new tariff raised duties on chemicals, engineering goods, and steel products and lowered those on textiles. The openness of the Italian economy was then remarkably reduced by the autarky policy of the fascist government. This raised tariffs in the late 1920s and imposed quotas in the early 1930s (Federico and Giannetti 1999).

The years between the two world wars saw a further reduction of the share of primary products on Italy's exports which, at the eve of WW2, had decreased to half of the total. For the first time, the share of manufactures reached that of primary products. At the same time, there was also a reduction in exports' concentration. Exports of raw silk collapsed and almost disappeared with a share that in 1939 dropped to two per cent. The top product had become a manufactured one, cotton fabrics, followed by dried fruits and artificial fibres (Vasta 2010).

Fig. 3. Italian exports 1951-2004 (1990 prices)



After WW2 the new democratic government decided trade liberalization. After so many years and the war inflation, the old 1921 tariff was clearly obsolete. Italy substituted it with a new one in 1950, which entailed a return to the moderate protectionism of the 1920s. Behind this shield Italy could afford to abolish all quotas in 1951, well before any other country in the OECD. In the same year, Italy took a decisive step towards liberalization by joining the European Community for Steel and Coal. In spite of the gloomy predictions of many industrialists and experts, the Italian steel industry was not swept away by foreign competition. In the years following, Italy was quite active in the foundation of the EEC in 1957. The liberalization of imports was gradual, and duties were totally abolished in 1968 (Federico 1999; Federico and Giannetti 1999). Moreover, the USA agreed that the exchange rate of the Italian lira within the Bretton Woods international monetary system were established at a value low enough to allow the development of an exporting industry in Italy (De Cecco 2003).

In this context, the post-WW2 years saw an impressive and long-lasting growth of Italian real exports that passed form 9,105 billion lire in 1951 to 456,362 billion lire in 2001 (at 1990 prices), with a staggering average growth rate of 8.14 per cent a year over fifty years (see Figure 3). The exports' annual growth rate was 12.16 per cent from 1951 to 1958. It further rose to 13.76 in the decade that followed the creation of the EEC. Then it declined to 5.55 per cent in the 1970s and to 4.81 per cent in the 1980s, but it rose again to 6.33 per cent in the 1990s.

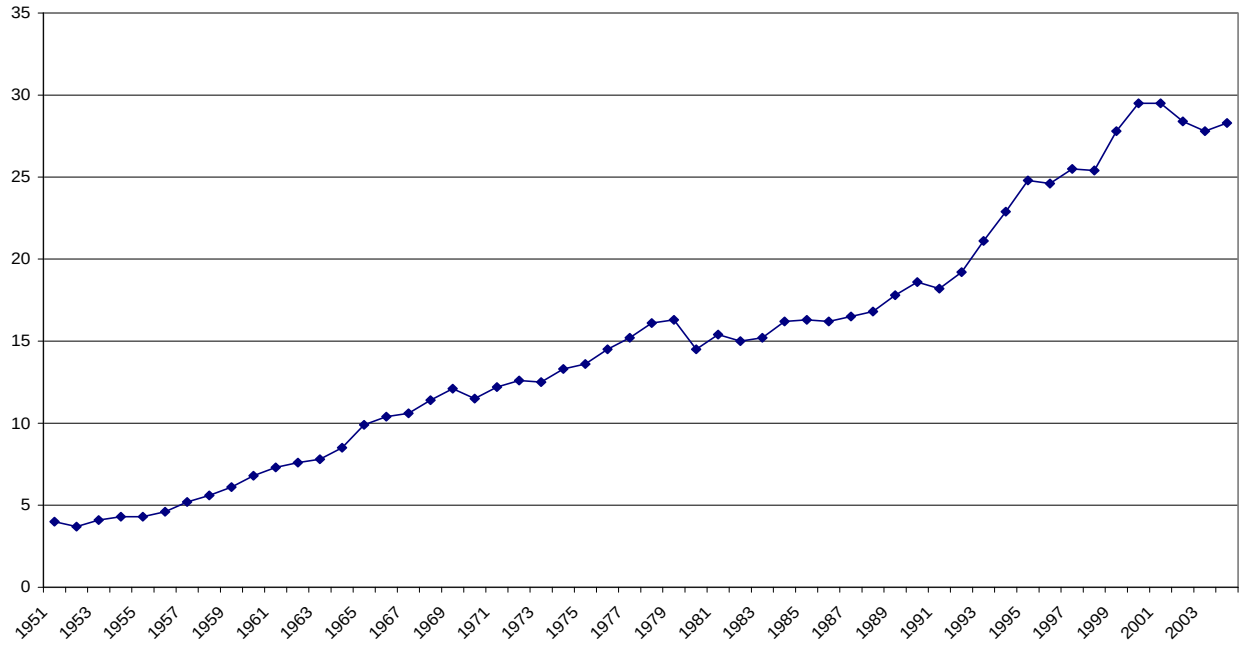
However, this long phase of growth of Italian exports seems to have come to an end at the beginning of the XXI century and in the years from 2002 to 2004 the 2001 peak was not reached again.

Over the 1951-2001 period exports grew much faster than national output and this had the consequence of progressively enhancing their weight on the GDP. It is worth noticing that in the immediate post-WW2 years the ratio of real exports to real GDP was much lower not only than the late 1920s peak, but also than that of the 1930s[7]. In fact, in 1951 exports accounted only for 4 per

[7] Of course, our data on the share of exports to GDP are affected by the fact that we calculated real exports by using a specific deflator for export goods which was different from the GDP deflator. If the exports to GDP ratio had been calculated at current prices – as it was commonly the case in the literature (Federico 1998; Roccas 2003) – it would have amounted to about 10 per cent in the early 1950s.

cent of Italy's GDP. The 5 per cent threshold was crossed only in 1957 and the pre-war 12 per cent peak only in 1969. Then the weight of exports on national output further rose in the 1970s (16.3 per cent in 1979), slowed down its growth pace in the 1980s (17.8 per cent in 1989), and soared in the 1990s up to a staggering 29.5 per cent peak in the years 2000 and 2001 (see Figure 4). As a result, the cumulative growth of both real exports and their weight on real GDP over a period of half a century triggered ELG and became the determinant of the growth of the national economy in the long run.

Fig. 4. Ratio of exports to GDP in Italy (1951-2004)



We can also observe that after the wave of strikes and social unrest of the 'hot autumn' of 1969 put an end to a long period of fast and steady growth of Italian exports principally based on the competitive advantage provided by cheap labour costs (Gomellini and Pianta 2007), there were two phases in which the expansion of Italian exports and of their share of GDP grew particularly fast. These were the years 1973-1979 and 1993-1995 that followed the two larger devaluations of the Italian lira.

It is possible to argue that the passage in the early 1970s from fixed to fluctuating exchange rates as a consequence of the collapse of Bretton Woods international monetary system and the possibility to rely on periodical devaluations of the national currency was one of the main drivers that enabled Italy to boost its exports for so long a time and therefore keep ELG functioning in the long run (De Cecco 2000).

However, the beginning of the XXI century seems to have marked a turning point in this respect. In fact, in 2002 Italy abandoned the lira to join the newly-created European single currency, the euro. Such a circumstance prevents now Italy from resorting to competitive devaluations to prompt its exports and is probably a major reason of the reduction of Italian real exports and their share of GDP in the first years of the XXI century.

The post-WW2 years saw also a big change in the structure of Italian exports, that was actually concentrated from the early 1950s and the early 1970s. First of all we can notice a strong reduction in primary products, which passed from more than one third to less than one sixth of the total. Conversely, manufactures rose from 65 per cent in the early 1950s to 84 per cent in the early 1970s. This shift was accompanied by an even bigger change in the composition of manufactured exports: on the one hand there was a decline in traditional products, especially textiles and clothing, while on the other hand there was a strong increase in the share of mechanical products (in particular machinery and transport equipment) – which jumped from 20 per cent to 35 per cent of Italy's total

exports – and, to a lesser extent, of chemicals. In brief, the fast growth of exports was accompanied by a change in their composition, which became more similar to that of more industrialized nations. By contrast, in the period since the mid-1970s the growth of Italian exports was accompanied by only minor changes in their composition: primary products went further down to 10 per cent of the total while manufactures went slightly up to 90 per cent. Among the latter, mechanical goods rose to 37 per cent. Thus, in the last thirty years Italian exports became polarized in two categories, the first one pertaining to the traditional sectors of the 'Made in Italy' (which includes personal and household goods such as textiles, clothing, leather, footwear, wood, tiles, furniture, jewellery, cosmetics, musical instruments, toys and sports items), and the second one to mechanical productions largely constituted by the machinery to manufacture the former (Vasta 2010).
It is someway possible to argue that the ELG of the 'Made in Italy' sector led the growth of the machinery sector that at a certain point in time also became export-led. As the latter was a capital goods industry it could more easily generate those technological spillovers that spread throughout the economy and translated into a higher overall economic growth.

6. Conclusions

This paper has investigated the causal relationship between real exports and real GDP in Italy from 1863 to 2004 by using cointegration analysis and causality tests. The outcome suggests that in the period prior to WW1 the growth of the Italian economy led that of exports, while in the post-WW2 period the causal relationship was reversed with the expansion of exports that determined that of the GDP. For the years from 1914 and 1939 we found no long run relationship between export and economic growth as a consequence of the fall of Italian exports during WW1 and of the collapse of world trade in the years that followed the Great Depression.
This paper does not support the Bonelli-Cafagna view that the growth of the Italian economy in the years from Unification (or earlier) to WW1 was led by a long wave of growth and accumulation stimulated by an expansion of exports, particularly of agricultural goods and raw silk. We argue instead that in the fifty years prior to WW1 the weight of the exporting sector on the Italian economy was too small and did not grow fast enough to trigger ELG. Moreover, the exports consisted largely of primary products that could not generate technological spillovers capable of translating into a higher rate of innovation and more rapid growth of the whole economy. Conversely, our results are consistent with Fenoaltea (1988a, 2006) thesis that links Italy's economic growth to international capital inflows: these boosted investments in constructions, infrastructures, industry, and public utilities which induced economic growth. More modern plants and higher production capacity in turn prompted Italy's capacity to export.
The 1951-2004 years saw an impressive and long-lasting growth of Italian real exports and on their weight on national output which enabled to set in motion ELG. The opening-up of European markets as a consequence of the creation of the EEC and, since the 1970s, the possibility of resorting to recursive devaluations of the Italian lira were among the major factors that fostered the expansion of Italian exports in that period. Italian exports became increasingly specialized in the durables of the 'Made in Italy' and in the machinery to make them. As the latter was a capital goods industry it could more easily generate those technological spillovers that spread throughout the economy and translated in a higher overall economic growth.
Lastly, our results are coherent with the 'threshold effect' thesis. It is possible to argue that in the 1863-1913 period Italy was still a mainly agricultural country that had not achieved a stage of development – or level of industrialization – high enough to engender ELG. Conversely, the situation had reversed in the 1951-2004 years. The manufacturing sector accounted for a much larger share of the economy than before WW1 and was now able to trigger ELG.

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