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# CAPITAL INFLOWS, CURRENT ACCOUNTS AND THE INVESTMENT CYCLE IN ITALY: 1861–1913

Barbara Pistoresi and Alberto Rinaldi


## ABSTRACT

*Relying on a new dataset, this paper examines the genesis of current account fluctuations and the investment cycle in Italy. We perform a Granger causality test that shows that the persistent current account deficits in the years from unification to World War I were generated by variations in capital inflows, as hypothesized by Fenoaltea, and not by the dynamics of GDP, as in the Bonelli–Cafagna model. Finally, we show that these capital inflows prompted an industrial investment cycle in equipment and machinery but not – as claimed by Fenoaltea (1988) – a general investment cycle which included also construction and more volatile components of investment. These patterns held under both fixed and floating exchange rate regimes.*


**Keywords:** Capital imports; current accounts; investment cycle; Italy; Granger causality

**JEL Classifications:** F43; O11; N1; N7

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## INTRODUCTION

The dynamics of Italy's balance of payments (BOP) in the years of the "classical" gold standard has been widely debated. Until the 1980s, the prevailing view was broadly Keynesian (Bonelli, 1978; Cafagna, 1989). It assumed that exports are totally exogenous, determined by core country demand for the nation's products, while imports are a function of the nation's GDP. In this scenario, the trade balance – and, more generally, the current account (CA) balance – is seen as highly sensitive to the domestic rate of growth; if the rate exceeds some threshold level, the balance would plunge into deficit. In the short run, this deficit can be financed by selling reserves or by importing capital, while in the medium run, devaluation can provide some relief. However, devaluation is at best a stop-gap measure, since imports – principally foodstuffs and raw materials – were price inelastic. In the long run, the only effective solution to CA problems is a lower growth rate. After political unification in 1861, Italy was a relatively backward and resource-poor country, which required massive investment in plant, equipment and modern infrastructure for industrialization. Since the import content of domestic output growth was large, the problem was to find a way to ease CA pressures. According to this view, a long wave of growth began in the late 18th century – well before Italy's political 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 CA. The agrarian crisis of the 1880s put an end to the leading role of agriculture as Italy's export engine but, by that time, other sectors (especially textiles and other manufactures) had taken up the slack and a mix of emigrant remittances and tourism helped to finance growth-induced imports.

In recent years, the Bonelli–Cafagna view has been turned upside-down. It is now assumed that the driving force was capital flows, and that the balance of trade and the CA balance adjusted to them. When capital flowed in, for whatever reason, the CA balance was in deficit; when Italy exported capital, the CA balance was in surplus. Two hypotheses have been put forward about what drove capital flows. Fratianni and Spinelli (1984) and, more explicitly, Spinelli (1988) focus on the difference between actual and desired money supply in the framework of the monetary theory of BOP. Italy exported capital (and the lira depreciated) when the money supply (driven up by the state deficit) exceeded the desired one, thereby forcing the nation to abandon the parity with gold, as it was the case from 1866 to 1882. Fenoaltea (1988, 2011) instead stresses the role of decisions by core countries' investors – especially Britons – about the profitability and risks of domestic and foreign investment. When, as in the 1880s, they preferred investing abroad, the world capital market was flooded with liquidity, and all peripheral countries – including Italy – imported huge quantities of capital.

As it is well-known, capital inflows and the CA deficit move together. In general, either may cause the other. The CA balance is the variable theoretically of interest in Fenoaltea's argument. However, as the movement of goods is the least uncertain component of Italy's BOP, Fenoaltea in his empirical investigation used the trade balance as a proxy for the CA balance. Fenoaltea (2011) observed that a BOP equilibrium can be disturbed by impulses that arise in the market for goods, or in the market for capital. In the former case, if a trade deficit appears because of an increase in imports, it tends to reduce the real exchange rate (either through a devaluation of the currency, with flexible exchange rates, or through a reduction of the internal price level, relative to the foreign one, with fixed exchange rates). The trade deficit is covered by induced capital inflows: with flexible exchange rates the devaluation of the currency may be seen as temporary, causing speculative purchases of the nation's currency in view of its subsequent recovery; with fixed exchange rates the loss of currency causes a net demand for liquidity that attracts foreign loans. In the event, the trade deficit and capital imports increase together, accompanied by a decline in the real exchange rate. If the initial equilibrium is disturbed in the opposite way, by an increase in exports, the trade deficit and capital imports decline together, while the real exchange rate increases. In the alternative scenario, a BOP disequilibrium appears because the nation imports more capital than before. As a result, the real exchange rate rises (as the currency appreciates, or the domestic price level increases relative to the foreign one). This rise in the real exchange rate in turn increases the trade deficit: the trade deficit and capital imports again rise together, and the real exchange rate rises too. If the initial equilibrium is disturbed in the opposite way, by a reduction in capital imports, the trade deficit and capital imports decline together, and the real exchange rate also declines. The trade deficit and capital imports move together in any case, but with parallel movements in the real exchange rate if the initial impulse is in financial markets and the capital flows cause the trade deficits, and with opposite movements in the real exchange rate if the initial impulse is in the goods market and trade deficits cause the flows of capital. Fenoaltea showed that, prior to World War I, the Italian currency was strong when the trade deficit and capital flows were high, and weak when they were low. With a brief exception in the early 1870s, the movement in the real exchange rate was parallel to that in the trade deficit and capital imports: the trade-deficit cycle was generated by the capital-import cycle, and not vice versa.

In Fenoaltea's analysis capital flows are not only the determinant of BOP fluctuations, but also the main cause of business cycles in Italy. In an attempt to explain Italy's economic growth and fluctuations, Fenoaltea (1988) argued that swings in Italian construction and in other activities were driven by fluctuations in British capital exports that were, in turn, determined by investor sentiment in Britain. Capital inflows in Italy were due to an abundance of foreign capital supply, and not to the pressure of investment demand exceeding domestic saving: capital inflows were the cause, and not the effect, of the construction cycle. In a more recent formulation, Fenoaltea (2011) held that exogenous capital inflows prompted not just the construction cycle, but a more general investment cycle in Italy. Construction and industrial investment were part of the same cycle: both were high when capital inflows were abundant and were low when foreign capital withdrew from the country. Thus, he maintained that Italy's investment cycle was no more than the Italian component of a worldwide cycle in capital formation common to the financial periphery as a whole. The willingness of non-Italians to invest in Italy rose and fell with their willingness to invest in foreign assets in general and, contrary to what was argued by other authors – that is Warglien (1987) and, more recently, Bolchini (2006), Ciocca (2006) and De Cecco (2006) – only marginally influenced by the fluctuations in the supply of domestic capital. This means that the Italian cycle in capital formation (and, derivatively, in industrial and total production) was set in motion not by domestic economic and political factors but by external, globe-spanning events over which Italian governments had no or very little control.

By using Granger causation analysis and a new dataset, this paper tests Fenoaltea's thesis with regard to both the genesis of the CA fluctuations and of the investment cycle over the years 1861–1913. To take into account the possibility of two distinct chains of events depending on whether the Italian lira adhered to a fixed or floating exchange rate, we perform two separate Granger causality tests. One is for years when Italy adhered to the gold standard (1883–1892 and 1903–1913). The other is for years when gold convertibility of the Italian lira was suspended (1866–1882 and 1893–1902).

This paper is structured as follows. The section "Sources and Data" presents the sources and data we have used in our analysis. The section "The Evolution of Italy's Current Accounts" illustrates the evolution of Italy's

BOP and real investment series from unification in 1861 to 1913. The section "Testing Fenoaltea's Thesis: An Econometric Strategy" presents an econometric strategy to test Fenoaltea's thesis. The final section concludes.

## SOURCES AND DATA

In 1957 the Italian national statistical office produced the first estimates of Italy's BOP for the period 1861–1956 (Istat, 1957). However, several objections were raised against these series, which proved unreliable and internally inconsistent. In particular, as far as the years prior to World War I are concerned, Istat seems to have significantly overestimated the earnings of services, and especially of tourism (Marolla & Roccas, 1992; Zamagni, 1992). But, above all, Istat estimates of emigrants' remittances seem excessively variable. In fact, these estimates appear to be based on the gross *flow* of migrants, which similarly jumps up in 1901 and 1905, whereas remittances seem more reasonably tied to the savings by the *stock* of Italians abroad, which grew more smoothly from under 1 million in 1871 to some 6 million in 1911 (Fenoaltea, 2011).

To tackle such criticism, Morys (2006) presented a new and more reliable series of Italy's BOP for the period 1868–1913. The major difference from the Istat series was the criteria used to estimate emigrants' remittances. In the absence of good data relating to the money transferred by Italian emigrants, Morys relied on the number of emigrants and approximated what an average Italian emigrant would transfer home in his first, second, third etc. year based on some general patterns observed in the literature on international emigration. As Morys reconstructed also the remittances for Austria-Hungary – for which much better data are available – he could double-check his results and found that the series for this latter country was very close to the one he constructed by using the patterns taken from the literature.

As for the GDP series, Istat (1957) presented an estimate of Italy's national accounts for the 1861–1956 years which included a detailed reconstruction of both the production side and the 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. However, this work lacked key series (such as output by sector at constant prices), details on methodology and sources, and an appropriate degree of skepticism about official statistical sources

(Cohen & Federico, 2001). These series were only partially improved by a team of scholars led by the economist Giorgio Fuà, which provided new estimates of value added by sector at constant (1938) prices, implicit deflators by sector and use, and a comprehensive series on the capital stock from 1881 onwards (Ercolani, 1969; Fuà, 1965, 1969; Vitali, 1969). The Fuà team did not attempt to rebuild the core of the work by Istat: the estimates of value added at current prices. For this reason many scholars, troubled by flaws in the original data, remained unconvinced by this revision (Cohen & Federico, 2001).

It was only on occasion of the 150th anniversary of Italy's unification in 2011 that a project co-ordinated by the Bank of Italy presented a reconstruction of the national accounts, complete in both the production and expenditure sides, for the whole century and a half since unification (Baffigi, 2011; Brunetti, Felice, & Vecchi, 2011).

In this paper, we test Fenoaltea's argument by using a new dataset which, for the CA, uses the Istat (1957) series for the years 1861–1867 and the Morys (2006) series for the years 1868–1913.

For GDP, total investment, investment in construction and investment in plant, machinery and transport equipment, we rely on the new series provided by the Bank of Italy (Baffigi, 2011). The series of Italy's nominal exchange series is drawn from Fenoaltea (2011), while estimates of Italy's real exchange rates are drawn from Ciocca and Ulizzi (1990).[1]

## THE EVOLUTION OF ITALY'S CURRENT ACCOUNTS

Fig. 1 shows the evolution of Italy's BOP from 1861 to 1913. The dynamics of the ratios of CA to GDP and of the trade balance to GDP are shown separately. The trade balance was negative throughout the period under investigation. This persistent deficit was at least partially covered by other headings of the CA balance, above all remittances of Italian emigrants abroad and tourism. As a result, the CA balance performed far better and was positive in 21 years out of 54. A persistent CA surplus was obtained for 18 years in a row from 1891 to 1908. However, there were also three periods of persistent CA deficits: 1861–1870, 1879–1890 and 1909–1913.[2]

Fig. 2 shows the dynamics of real investment in Italy: the series for investment in construction; in plant, machinery and transport equipment; and total investment are shown separately.

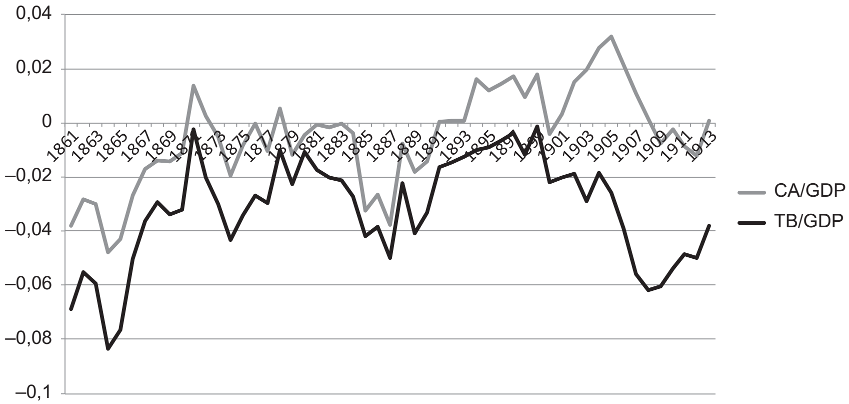


*Fig. 1.* CA/GDP and TB/GDP Ratios in Italy (1861–1913). *Note*: CA/GDP, Current Account to GDP ratio; TB/GDP, Trade Balance to GDP ratio.

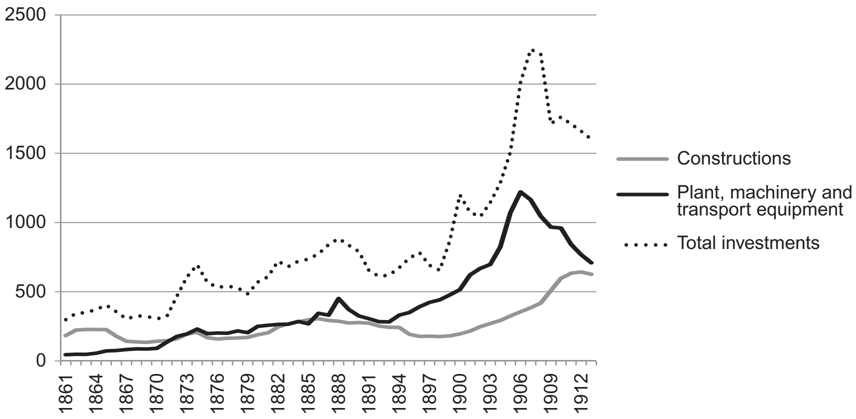


*Fig. 2.* Real Investment in Italy (1861–1913). *Note*: Values in thousands euros, 1911 prices.

Total investment grew from 1861 to 1865, but then declined for a few years in the wake of the war against Austria. Total investment doubled from 1871 to 1874 (the so-called "feverish triennium"); after ups and downs it dropped back in the late 1870s. The 1880s saw another upswing, which was followed by a fall in the following decade. Investment began to accelerate sharply at the end of the 19th century until 1907. This was a year of world financial crisis, when Italy's accumulation activity reached a peak which was followed by another fall in the five years leading to World War I.

In brief, in the years from unification to World War I the Italian economy went through a number of investment cycles that were characterized by phases of rapid growth followed by sharp downward swings. Fluctuations over time were sharper in industrial investment (plant, machinery and transport equipment) than in construction. Industrial investment also exhibited a higher growth trend: in 1861 investment in construction were three times as high as those in plant, machinery and transport equipment, whereas in 1907, the peak of the Italian pre-World War I investment cycle, the latter was three times as high as the former. The higher dynamics of industrial investment, as compared to investment in other sectors, triggered structural change in the Italian economy and facilitated a shift of productive factors from low to high productivity activities, especially from agriculture and construction to manufactures.

Another point to be emphasized is that upswings in the investment cycle occurred at a time when the CA balance was in deficit or showed a sharp decrease of its surpluses. The only exception is represented by the years from 1901 to 1905, which were characterized by both a boom in investment activity and growing CA surpluses, which were due to the increasing revenues from emigrants remittances. However, the 1907 peak in the investment cycle was preceded by a sharp decline in the CA surpluses in 1905 and 1906.

## TESTING FENOALTEA'S THESIS: AN ECONOMETRIC STRATEGY

Persistent external deficits can constrain economic growth because they can increase the interest rates the nation has to pay to attract foreign capital, and impose an excessive burden on future generations increasing interest payments and lowering the standard of living. This is the thesis underlying the Bonelli–Cafagna view. However, there are also cases in which persistent CA deficits are not linked to severe domestic macroeconomic imbalances and hence they do not curb economic development. As discussed in the Introduction, Fenoaltea (2011) argues that Italy's external deficits in the years 1861–1913 were determined by capital inflows that boosted investment, that is they were used to finance investment in construction and imports of machinery, other capital goods and raw materials, which in turn prompted economic growth.

Hence, a BOP disequilibrium appears because the nation imports more capital than before. As a result, the real exchange rate rises (as the currency appreciates, or the domestic price level increases relative to the foreign one). This surge in the real exchange rate in turn increases the trade deficit and the CA deficit (as the trade balance is by far the main component of the CA balance): the trade deficit and capital imports rise together, and the real exchange rate rises too. A similar argument holds if the initial equilibrium is disturbed in the opposite way, by a reduction in capital imports: the trade deficit and capital imports decline together, and the real exchange rate also declines.

Fenoaltea shows that, prior to World War I, the Italian currency was strong when the trade deficits and capital flows were high, and weak when they were low. With a brief exception in the early 1870s, the movement in the real exchange rate was parallel to that in the trade deficit and capital imports: the trade-deficit cycle was generated by the capital-import cycle, and not vice versa.

The increasing integration of capital markets in the years of the "classical" gold standard led Italy to participate fully in financial relations between the core and the periphery of the world economy. The world cycle in capital flows stemmed from the long swing in the confidence of core countries' investors – especially British savers – in investment in the periphery. Data on the premium required to invest in Italian bonds show that it followed a pattern similar to that for the entire periphery. Thus, according to Fenoaltea the Italian investment cycle seems to have been no more than the Italian component of a worldwide investment cycle: the willingness of non-Italians to invest in Italy rose and fell with their willingness to invest in the periphery as a whole, without significant peculiarities tied to Italy itself.

Fenoaltea's argument can be represented by this sequence of causation (henceforth, Fenoaltea's cycle):

↑↓ Foreign capital inflows → ↑↓ real exchange rate → ↑↓ trade deficits→ ↑↓ CA deficits→ ↑↓ real investment

The nexus among changes in the real exchange rate, CA balance and real investment can be analysed in an econometric framework with techniques appropriate for estimating long run equilibrium and testing causation. 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 $X$ is the CA to GDP ratio, $Z$ the real exchange rate and $Y$ the real investment and these series are not covariance stationary, while their first difference are stationary. Moreover, suppose they are not cointegrated that is they do not co-move over time in the long run. In this case, we can test Fenoaltea's argument by using the following short run specifications (ADL models)

$$\Delta X_t = \sum_{i=1}^{m} a_i \Delta X_{t-i} + \sum_{j=1}^{n} b_j \Delta Y_{t-j} + \sum_{k=1}^{K} e_k \Delta Z_{t-k} + \varepsilon_t \tag{1}$$

$$\Delta Y_t = \sum_{i=1}^{m} c_i \Delta Y_{t-i} + \sum_{j=1}^{n} d_j \Delta X_{t-j} + \sum_{k=1}^{K} f_k \Delta Z_{t-k} + \varepsilon_t \tag{2}$$

$$\Delta Z_t = \sum_{i=1}^{m} g_i \Delta Z_{t-i} + \sum_{j=1}^{n} h_j \Delta Y_{t-j} + \sum_{k=1}^{K} l_k \Delta X_{t-k} + \eta_t \tag{3}$$

Fenoaltea's thesis states that the real exchange rate dynamics is exogenous with respect to CA and investment variables, that is it only depends on its past values. This implies $h_j = l_k = 0$ in model (3). CA variations are Granger caused by real exchange rate dynamics and hence $b_j = 0$ in model (1), while the dynamics of real investment is Granger caused by the CA fluctuations. This latter implies that in model (2) possibly $f_j = 0$.

The existence of a time lags structure in the above models is justified as follows:

(a) It takes time for a change in real exchange rate to affect import and export spending, so the change in CA lags the change in real exchange rate;
(b) It takes even more time to install capital equipment, so that investment can lag the real exchange rate and the CA variations.

To sum up, the causality-testing procedure involves three steps. The first step is to test whether our variables of interests are stationary or not (*integration analysis*). If they are not stationary, the second step is to *test for cointegration*, that is for the existence of long run relationships among them. If cointegration does not exist, *Granger causality* must be tested on the ADL models 1−3.

In the following we present the results of the univariate integration analysis on the series.[3] Table 1 summarizes the final outcomes for ADF (OLS/GLS) and KPSS tests for the *levels* and *first differences* of the variables involved in Fenoaltea's cycle by using different specifications and lags. All

***Table 1.*** Stationarity of the Italian Current Account to GDP Ratio, Real Exchange Rate, Real Total, Investment Real Investment in Machinery and Equipment, Real Investment in Construction − A Summary: 1861−1913.

| Variable | Degree of Integration from the ADF Test − OLS | Degree of Integration from the ADF Test − GLS | Degree of Integration from the KPSS Test |
|---|---|---|---|
| *Current account/GDP* | | | |
| CA/GDP | I(0)/I(1) | I(0) | I(0) |
| CA/GDP | I(0)/I(1) | I(0)/I(1) | I(1) |
| CA/GDP | I(1) | I(1) | I(0) |
| Δ(CA/GDP) | I(0) | I(0) | I(0) |
| CA/GDP | I(0) | I(0) | I(0) |
| *Real exchange rate, ε; nominal exchange rate, E* | | | |
| ε, *E* | I(1) | I(1) | I(1) |
| ε, *E* | I(1) | I(1) | I(1) |
| ε, *E* | I(1) | I(1) | I(1) |
| Δε, Δ*E* | I(0) | I(0) | I(0) |
| *Total real investment* | | | |
| Lreal Total I | I(1) | I(1) | I(1) |
| Lreal Total I | I(1) | I(1) | I(1) |
| Lreal Total I | I(1) | I(1) | I(1) |
| ΔLreal Total I | I(0) | I(0) | I(0) |
| *Real investment in machinery and equipment* | | | |
| Lreal IE | I(1) | I(1) | I(1) |
| Lreal IE | I(1) | I(1) | I(1) |
| Lreal IE | I(1) | I(1) | I(1) |
| ΔLreal IE | I(0) | I(0) | I(0) |
| *Real investment in construction* | | | |
| Lreal IC | I(1) | I(1) | I(1) |
| Lreal IC | I(1) | I(1) | I(1) |
| Lreal IC | I(1) | I(1) | I(1) |
| ΔLreal IC | I(0) | I(0) | I(0) |

*Note*: I(0) means stationary series (no unit root is present). I(1) means non-stationary series (i.e., presence of at least one unit root). Note that the complete set of results for these tests is available as a preliminary draft of the paper (Pistoresi & Rinaldi, 2013).

the variables in levels are non-stationary, in particular I(1), so we need to use in our analysis their first differences. There is no cointegration between the variables involved in Fenoaltea's cycle, that is these variables do not share common trends in the long run.[4] This result implies that we have to use the ADL models 1−3.

To take into account the possibility that there were distinct chains of events depending on whether Italy adhered to a floating or a fixed exchange rate regime, we perform two separate Granger causality tests. One is for years in which the convertibility of the Italian currency was suspended, that is 1866−1882 and 1893−1902 (see Table 2, floating exchange rate). The other is for years in which the Italian lira adhered to the gold standard, that is 1883−1892 and 1903−1913 (see Table 3, fixed exchange rate). There might be a difference between the chain of events that holds under floating rates and the chain that holds under fixed rates. In the former case, an exogenous change in capital flows to Italy would immediately affect the nominal exchange rate, hence the real exchange rate, the CA, real investment and real output. In the latter case, an exogenous change in international capital flows to Italy might have no immediate effect on the real exchange rate. With a lag, there would be effects on the CA, real investment, real output and wages and prices. As Italian wages and prices change, so does the real exchange rate.

For the set of years when the exchange rate was floating we use the nominal exchange rate (Fenoaltea, 2011) because in such a circumstance nominal and real exchange rates move together. Conversely, for the set of years in which the exchange rate was fixed we use the estimate of the real exchange rate by Ciocca and Ulizzi (1990).

Tables 2 and 3 also present the Granger causation analysis including variations in real investment to close Fenoaltea's cycle: we consider real investment in plant, machinery and transport equipment; real investment in construction; and real total investment.

Under floating exchange rates, as expected we also find the exogeneity of the nominal exchange rate (Table 2, tests on model 3). Moreover, there is evidence of unidirectional Granger causation from the nominal exchange rate to the CA to GDP ratio (Table 2, tests on models 1 and 2). Finally, as to the investment cycle, Fenoaltea's thesis is confirmed only for real investment in equipment and machinery. We find no statistical evidence of unidirectional Granger causation from the CA to GDP ratio to both real investment in construction and total real investment (Table 2, tests on models 1 and 2). That is, an exogenous change in international capital flows to Italy immediately and simultaneously affected the nominal

***Table 2.*** Current Account to GDP Ratio, Nominal Exchange Rate[a] and Real Investment (Logs) – Granger Causality ADL (2,2) – Floating Exchange Rate Years (1866–1882; 1893–1902).

| | $H_0$: The Past Does Not Matter | $F$ test – $p$-Value | Outcome | Causality Conclusion |
|---|---|---|---|---|
| (1) $\Delta CA/GDP_t = \alpha + \beta_1 \Delta (CA/GDP)_{t-1} + \ldots + \delta_1 \Delta E_{t-1} + \ldots + \gamma_1 \Delta real I_{t-1} + \ldots + \eta_t$ | | | | |
| Investment in equipment and machinery | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.94 | Fail to reject $H_0$ | Changes in I *do not cause* CA/GDP variations |
| Investment in total construction | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.44 | Fail to reject $H_0$ | Changes in I *do not cause* CA/GDP variations |
| Total investment | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.22 | Fail to reject $H_0$ | Changes in I *do not cause* CA/GDP variations |
| Investment in equipment and machinery | $H_0{:}\delta_1 = 0$ | $p$-value = 0.06 | Reject $H_0$ 6% | Changes in exchange rate *cause* CA/GDP variations |
| Investment in total construction | $H_0{:}\delta_1 = 0$ | $p$-value = 0.00 | Reject $H_0$ | Changes in exchange rate *cause* CA/GDP variations |
| Total investment | $H_0{:}\delta_1 = 0$ | $p$-value = 0.37 | Fail to reject $H_0$ | Changes in exchange rate *do not cause* CA/GDP variations |
| (2) $\Delta L real IE_t = \alpha + \beta_1 \Delta (CA/GDP)_{t-1} + \ldots + \delta_1 \Delta E_{t-1} + \ldots + \gamma_1 \Delta real I_{t-1} + \ldots + \eta_t$ | | | | |
| Investment in equipment and machinery | $H_0{:}\beta_1 = 0$ | $p$-value = 0.08 | Reject $H_0$ 8% | Changes in CA/GDP *cause* I variations |
| Investment in total construction | $H_0{:}\beta_1 = 0$ | $p$-value = 0.60 | Fail to reject $H_0$ | Changes in CA/GDP *do not cause* I variations |
| Total investment | $H_0{:}\beta_1 = 0$ | $p$-value = 0.76 | Fail to reject $H_0$ | Changes in CA/GDP *do not cause* I variations |
| Investment in equipment and machinery | $H_0{:}\delta_1 = 0$ | $p$-value = 0.04 | Fail to reject $H_0$ | Changes in exchange rate *do not cause* I variations |
| Investment in total construction | $H_0{:}\delta_1 = 0$ | $p$-value = 0.10 | Fail to reject $H_0$ | Changes in exchange rate *do not cause* I variations |
| Total investment | $H_0{:}\delta_1 = 0$ | $p$-value = 0.52 | Fail to reject $H_0$ | Changes in exchange rate *do not cause* I variations |

***Table 2.*** *(Continued)*

| | $H_0$: The Past Does Not Matter | $F$ test − $p$-Value | Outcome | Causality Conclusion |
|---|---|---|---|---|
| (3) $\Delta E_t = \alpha + \beta_1 \Delta(\text{CA/GDP})_{t-1} + \ldots + \delta_1 \Delta E_{t-1} + \ldots + \gamma_1 \Delta \text{real} I_{t-1} + \ldots + \eta_t$ | | | | |
| Investment in equipment and machinery | $H_0{:}\beta_1 = 0$ | $p$-value = 0.04 | Fail to reject $H_0$ 1% | Changes in CA/GDP *do not cause* exchange rate variations |
| Investment in total construction | $H_0{:}\beta_1 = 0$ | $p$-value = 0.051 | Fail to reject $H_0$ | Changes in CA/GDP *do not cause* exchange rate variations |
| Total investment | $H_0{:}\beta_1 = 0$ | $p$-value = 0.23 | Fail to reject $H_0$ | Changes in CA/GDP *do not cause* exchange rate variations |
| Investment in equipment and machinery | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.12 | Fail to reject $H_0$ | Changes in I *do not cause* exchange rate variations |
| Investment in total construction | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.60 | Fail to reject $H_0$ | Changes in I *do not cause* exchange rate variations |
| Total investment | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.75 | Fail to reject $H_0$ | Changes in I *do not cause* exchange rate variations |

*Note:* Robust standard errors estimation.
[a]Note that for the set of years when the exchange rate was floating we use the nominal exchange rate because in such a circumstance nominal and real exchange rates move together.

***Table 3.*** Current Account to GDP Ratio, Real Exchange Rate and Real Investment – Granger Causality, ADL (1,1) – Fixed Exchange Rate Years (1883–1892; 1903–1913).

| | $H_0$: The Past Does Not Matter | $F$ test – $p$-Value | Outcome | Causality Conclusion |
|---|---|---|---|---|
| (1) $\Delta CA/\mathrm{GDP}_t = \alpha + \beta_1 \Delta(\mathrm{CA/GDP})_{t-1} + \ldots + \delta_1 \Delta\varepsilon_{t-1} + \ldots + \gamma_1 \Delta \mathrm{real} I_{t-1} + \ldots + \eta_t$ | | | | |
| Investment in equipment and machinery | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.22 | Fail to reject $H_0$ | Changes in I *do not cause* CA/GDP variations |
| Investment in total construction | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.14 | Fail to reject $H_0$ | Changes in I *do not cause* CA/GDP variations |
| Total investment | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.19 | Fail to reject $H_0$ | Changes in I *do not cause* CA/GDP variations |
| Investment in equipment and machinery | $H_0{:}\delta_1 = 0$ | $p$-value = 0.044 | Reject $H_0$ | Changes in exchange rate *cause* CA/GDP variations |
| Investment in total construction | $H_0{:}\delta_1 = 0$ | $p$-value = 0.032 | Reject $H_0$ | Changes in exchange rate *cause* CA/GDP variations |
| Total investment | $H_0{:}\delta_1 = 0$ | $p$-value = 0.049 | Reject $H_0$ | Changes in exchange rate *cause* CA/GDP variations |
| (2) $\Delta L\mathrm{real}IE_t = \alpha + \beta_1 \Delta(\mathrm{CA/GDP})_{t-1} + \ldots + \delta_1 \Delta\varepsilon_{t-1} + \ldots + \gamma_1 \Delta \mathrm{real} I_{t-1} + \ldots + \eta_t$ | | | | |
| Investment in equipment and machinery | $H_0{:}\beta_1 = 0$ | $p$-value = 0.10 | Reject $H_0$ 10% | Changes in CA/GDP *cause* I variations |
| Investment in total construction | $H_0{:}\beta_1 = 0$ | $p$-value = 0.13 | Reject $H_0$ 13% | Changes in CA/GDP *cause* I variations |
| Total investment | $H_0{:}\beta_1 = 0$ | $p$-value = 0.89 | Fail to reject $H_0$ | Changes in CA/GDP *do not cause* I variations |
| Investment in equipment and machinery | $H_0{:}\beta_1 = 0$ | $p$-value = 0.22 | Fail to reject $H_0$ | Changes in exchange rate *do not cause* I variations |
| Investment in total construction | $H_0{:}\beta_1 = 0$ | $p$-value = 0.39 | Fail to reject $H_0$ | Changes in exchange rate *do not cause* I variations |
| Total investment | $H_0{:}\beta_1 = 0$ | $p$-value = 0.66 | Fail to reject $H_0$ | Changes in exchange rate *do not cause* I variations |

***Table 3.*** *(Continued)*

| | $H_0$: The Past Does Not Matter | $F$ test − $p$-Value | Outcome | Causality Conclusion |
|---|---|---|---|---|
| (3) $\Delta\varepsilon_t = \alpha + \beta_1 \Delta(\text{CA/GDP})_{t-1} + \ldots + \delta_1 \Delta\varepsilon_{t-1} + \ldots + \gamma_1 \Delta \text{real} I_{t-1} + \ldots + \eta_t$ | | | | |
| Investment in equipment and machinery | $H_0{:}\beta_1 = 0$ | $p$-value = 0.33 | Fail to reject $H_0$ | Changes in CA/GDP *do not cause* exchange rate variations |
| Investment in total construction | $H_0{:}\beta_1 = 0$ | $p$-value = 0.69 | Fail to reject $H_0$ | Changes in CA/GDP *do not cause* exchange rate variations |
| Total investment | $H_0{:}\beta_1 = 0$ | $p$-value = 0.61 | Fail to reject $H_0$ | Changes in CA/GDP *do not cause* exchange rate variations |
| Investment in equipment and machinery | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.37 | Fail to reject $H_0$ | Changes in I *do not cause* exchange rate variations |
| Investment in total construction | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.58 | Fail to reject $H_0$ | Changes in I *do not cause* exchange rate variations |
| Total investment | $H_0{:}\gamma_1 = 0$ | $p$-value = 0.23 | Fail to reject $H_0$ | Changes in I *do not cause* exchange rate variations |

*Note:* Robust standard errors estimation.

exchange rate, and hence the real exchange rate. Then, with a lag, there were effects on the CA and real investment, even though the latter were significant only with respect to investment in machinery and equipment.

When the Italian lira adhered to the gold standard (Table 3, tests on model 3) the exogeneity of the real exchange rate also strongly emerges: changes in the CA to GDP ratio and in investment do not Granger-cause variations in the real exchange rate, as suggested by Fenoaltea. We note that Fenoaltea's argument – that is a change in the real exchange precedes the change in the CA – holds *whether or not* wages and prices are flexible (as long as it takes time for the CA to adjust to a change in the real exchange rate). If the exchange rate is fixed and wages and prices are sticky, a shock to demand for Italian assets would be immediately associated with a capital inflow, a gold inflow and an increase in the Italian money supply.[5] This would be followed, with a lag, by an increase in real investment, real output and Italian wages and prices. The increase in wages and prices means an increase in the real exchange rate, which would be followed, with a lag, by a decrease in the CA. Conversely, if the exchange rate is fixed and wages and prices are perfectly flexible, the timing of Fenoaltea's cycle would be that a shock to demand for Italian assets is immediately associated with a capital inflow, a gold inflow, an increase in the Italian money supply and an increase in Italian wages and prices. The increase in wages and prices means an increase in the real exchange rate, which would be followed, with a lag, by a decrease in the CA. Either way the decrease in the CA occurs subsequent to the increase in the real exchange rate. What is different between the two cases is that, if wages and prices are flexible, the increase in the real exchange rate occurs immediately with the shock to demand for Italian assets and the gold inflow; while if wages and prices are sticky, the increase in the real exchange rate takes place months after the shock to demand for Italian assets and the gold inflow. So our exercise does not allow us to discriminate which of these two cases holds and is not a test on wage and price flexibility.

As to the investment cycle, for years when Italy adhered to the gold standard we find unidirectional Granger causation from the CA to GDP ratio to real investment in equipment and machinery and only a weak evidence (at 13% significance level) to real investment in total construction. We find no statistical evidence of unidirectional Granger causation from the CA to GDP ratio to real total investment, probably due to the high volatility of some components of the latter series. Thus, it seems that when the Italian lira was pegged on gold CA deficits were used principally to boost industrial investment rather than a general investment cycle that involved all sectors of the economy.

In brief, our econometric results provide only a partial confirmation for Fenoaltea's theory of the investment cycle in Italy: both when Italy adhered to the gold standard and when the convertibility of the Italian lira was suspended Fenoaltea's cycle holds only for industrial investment (in equipment and machinery), but we do not find evidence in support of a general investment cycle triggered by exogenous capital inflows that boosted also investment in construction and other more volatile components of total investment.

Thus, this paper supports the claim that foreign capital played a substantial part in fostering Italy's industrialization in the years prior to World War I. It is well documented that, starting from the 1880s, foreign capital flew to Italy to boost investment in transport (railways and tramways) and utilities (gas, light and water supply) which sustained a progressive process of urbanization in the largest centers of the peninsula, as Milan, Genoa, Turin and Naples. At the same time, foreign entrepreneurs started successful ventures in capital- and technology-intensive industries, such as electricity and electro-mechanics, but also in cotton (Zamagni, 1978). On the eve of World War I, several industries in Italy were characterized by a substantial presence of foreign capital. In the energy industry (basically, electricity), FDI accounted for nearly 50% of the total capital invested in that sector. Moreover, foreign-owned firms controlled 13% of share capital in the textile industry, 43% in electrical equipment and 33% in chemicals. That is, FDI tended to privilege those industries in which Italian entrepreneurship was weaker and in which the amount of capital needed for investment was larger and not immediately available on the domestic financial market (Colli, 2010).

## CONCLUSIONS

By using Granger causation analysis and a new dataset, this paper tests Fenoaltea's thesis with regard to the genesis of both CA fluctuations and the investment cycle over the years 1861–1913.

To take into account the possibility of two distinct chains of events depending on the fact that Italy adhered to a fixed or floating exchange rate, we perform two separate Granger causality tests, for the set of years in which Italy adhered to the gold standard (1883–1892 and 1903–1913), and for the set of years in which the convertibility of the Italian lira to gold was suspended (1866–1882 and 1893–1902).

Our main results are that, under floating exchange rates, the exogeneity of the real exchange rate strongly emerges. We also find unidirectional Granger causation from real exchange rate to the CA to GDP ratio as claimed by Fenoaltea: Italy's persistent external deficits in these years were determined by capital inflows and not by impulses that rose in the market for goods. As to the investment cycle, Fenoaltea's thesis is confirmed only for real investment in equipment and machinery.

Under fixed exchange rates, the exogeneity of the nominal exchange rate is confirmed. Moreover, there is evidence of unidirectional Granger causation from the nominal exchange rate to the CA to GDP ratio. As for the investment cycle, we find unidirectional Granger causation from the CA to GDP ratio to real investment in equipment and machinery; only weak evidence for causation to real investment in total construction, and no evidence of causation from the CA to GDP ratio to real total investment.

Therefore, our overall results show that persistent CA deficits in the years from unification to World War I were generated by variations in capital inflows, as argued by Fenoaltea, and not by the dynamics of GDP, as claimed by the Bonelli–Cafagna model. But they provide only partial confirmation for Fenoaltea's theory of the investment cycle in Italy: under both fixed and floating exchange rates the theory holds only for industrial investment (in equipment and machinery); there is no evidence in support of a general investment cycle triggered by exogenous capital inflows that boosted also investment in construction and other more volatile components of total investment.

## NOTES

1. Italy followed a bimetallic standard from 1861 to 1866, when convertibility was suspended in the wake of war against Austria. Italy re-enacted gold convertibility in 1883, but was forced to suspend specie payment again in 1893. Mint parity was achieved again in 1903 and maintained until the outbreak of World War I, but convertibility of bank notes into specie was not introduced. In sum, Italy was the jure on gold from 1883 to 1893 and de facto on gold from 1903 to 1914 (Morys, 2006).

2. By contrast, Spain showed persistent CA deficits from 1850 to 1890. These were followed by a period, between 1891 and 1913, in which surpluses prevailed, with the exception of the years 1899–1904 (Prados de la Escosura, 2010).

3. We perform ADF tests (OLS/GLS) and KPSS test. The null of the ADF tests is non-stationary series (unit root) while the null of the KPSS is stationary series. Hence, if both reject their nulls then we have no confirmation, but if test ADF rejects the null but test KPSS does not (or vice versa) we have confirmation. See Dickey and Fuller (1979) and Kwiatkowski, Phillips, Schmidt, and Shin (1992). For a detailed analysis of the results of the integration analysis by using ADF (GLS) and KPSS see Pistoresi and Rinaldi (2013).

4. The cointegration results are available on request. Part of these results are in Pistoresi and Rinaldi (2013).

5. We do not include gold flows and money supply in our econometric analysis because, given the short samples, there are not enough degrees of freedom to include additional variables.

# REFERENCES

Baffigi, A. (2011). *Italian national accounts, 1861−2011*. Quaderni di Storia Economica. Economic History Working Papers No. 18. Banca d'Italia, Rome, Italy.

Bolchini, P. (2006). A proposito di Stefano Fenoaltea, L'economia italiana dall'Unità nazionale alla Grande Guerra, Bari-Roma, 2006. *Rivista di storia economica*, *22*, 331−338.

Bonelli, F. (1978). Il capitalismo italiano: Linee generali di interpretazione. In R. Romano & C. Vivanti (Eds.), *Storia d'Italia. Annali I. Dal feudalesimo al capitalismo* (pp. 1193−1255). Turin, Italy: Einaudi.

Brunetti, A., Felice, E., & Vecchi, G. (2011). Reddito. In G. Vecchi (Ed.), *In ricchezza e in povertà. Il benessere degli italiani dall'Unità a oggi* (pp. 209−234). Bologna, Italy: Il Mulino.

Cafagna, L. (1989). *Dualismo e sviluppo nella storia d'Italia*. Venice, Italy: Marsilio.

Ciocca, P., & Ulizzi, A. (1990). I tassi di cambio nominali e 'reali' dell'Italia dall'Unità nazionale al Sistema Monetario Europeo (1861−1979). In S. Cardarelli (Ed.), *Ricerche per la storia della Banca d'Italia* (Vol. 1, pp. 341−368). Collana storica della Banca d'Italia, serie "contributi", vol. 1. Rome-Bari, Italy: Laterza.

Ciocca, P. (2006). A proposito di Stefano Fenoaltea, L'economia italiana dall'Unità nazionale alla Grande Guerra, Bari-Roma, 2006. *Rivista di storia economica*, *22*, 339−343.

Cohen, J., & Federico, G. (2001). *The growth of the Italian economy 1820−1960*. Cambridge, UK: Cambridge University Press.

Colli, A. (2010). Foreign enterprises (1913−72). In A. Colli & M. Vasta (Eds.), *Forms of enterprise in 20th century Italy. Boundaries, structures and strategies* (pp. 87−111). Cheltenham, UK: Edward Elgar.

De Cecco, M. (2006). A proposito di Stefano Fenoaltea, L'economia italiana dall'Unità nazionale alla Grande Guerra, Bari-Roma, 2006. *Rivista di storia economica*, *22*, 344−346.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, *74*, 427−431. doi:10.2307/2286348

Ercolani, P. (1969). *Documentazione statistica di base*. Milan, Italy: Franco Angeli.

Fenoaltea, S. (1988). International resource flows and construction movements in the Atlantic economy: The Kuznets cycle in Italy. *Journal of Economic History*, *48*, 605–637. doi:10.1017/S0022050700005854

Fenoaltea, S. (2011). *The reinterpretation of Italian economic history: From unification to the great war*. Cambridge, UK: Cambridge University Press.

Fratianni, M., & Spinelli, F. (1984). Italy in the gold standard period 1861–1914. In M. Bordo & A. J. Schwartz (Eds.), *A retrospective on the classical gold standard 1821–1931* (pp. 404–438). Chicago, IL: The University of Chicago Press.

Fuà, G. (1965). *Notes on Italian economic growth 1861–1964*. Milan, Italy: Giuffrè.

Fuà, G. (1969). *Lo sviluppo economico in Italia* (Vol. 3). Milan, Italy: Franco Angeli.

Granger, C. W. J. (1969). Investigating causal relations by econometric models: Cross spectral methods. *Econometrica*, *37*, 424–438.

Istat. (1957). Indagine statistica sullo sviluppo del reddito nazionale dell'Italia dal 1861 al 1956. In *Annali di statistica* (serie VIII, Vol. 9). Rome, Italy: Istat.

Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root. *Journal of Econometrics*, *54*, 159–178. doi:10.1016/0304-4076(92)90104-Y

Marolla, M., & Roccas, M. (1992). La ricostruzione delle bilancia internazionale dei servizi e trasferimenti unilaterali dell'anno 1911. In G. M. Rey (Ed.), *I conti economici dell'Italia. 2. Una stima del valore aggiunto per il 1911* (Vol. I.II, pp. 241–282). Rome-Bari, Italy: Laterza.

Morys, I. M. (2006). *The classical gold standard in the European periphery: A case study of Austria-Hungary and Italy, 1870–1913*. PhD thesis, London School of Economics and Political Science.

Pistoresi, B., & Rinaldi, A. (2013). *External constraint and economic growth in Italy: 1861–2000*. DEMB Working Papers Series No. 11. Dipartimento di Economia "Marco Biagi", Modena, Italy.

Prados de la Escosura, L. (2010). Spain's international position, 1850–1913. *Revista de Historia Económica*, *28*, 173–215. doi:10.017/S021261090999005X

Spinelli, F. (1988). Pasquale Jannacone: A neglected originator of the monetary approach to balance of payments and exchange rates. *Journal of European Economic History*, *17*, 203–225.

Vitali, O. (1969). *La stima del valore aggiunto a prezzi costanti per rami di attività*. Milan, Italy: Franco Angeli.

Warglien, M. (1987). Investimenti industriali ed instabilità finanziaria in Italia. *Rivista di storia economica*, 3, 384–439.

Zamagni, V. (1978). *Industrializzazione e squilibri regionali in Italia*. Bologna, Italy: Il Mulino.

Zamagni, V. (1992). Il valore aggiunto del settore terziario italiano nel 1911. In G. M. Rey (Ed.), *I conti economici dell'Italia. 2. Una stima del valore aggiunto per il 1911* (Vol. I.II, pp. 191–239). Rome-Bari, Italy: Laterza.