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by Paolo Garofalo

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EXCHANGE RATE REGIMES AND ECONOMIC PERFORMANCE: THE ITALIAN EXPERIENCE

by Paolo Garofalo*

Abstract

Using a *de facto* classification of the exchange rate regimes adopted in Italy since national unification, this paper examines the influence of different exchange rate policies on the country's economic performance. For perhaps the first time, a principal component analysis is used to obtain a composite indicator of the exchange rate policy *de facto* pursued by the monetary authorities. The study finds a significant association between exchange rate regimes and inflation and growth performance. In particular, the analysis reveals that Italy has performed best, in terms of output growth rate, under "soft peg" regimes, for example when the exchange rate was *de facto* pegged but the authorities were not legally committed to a fixed exchange rate or when rates were fixed but capital controls and adjustable pegs gave the authorities the opportunity to pursue independent macroeconomic policies. This result is at odds with recent literature according to which "corner solutions" — hard pegs or freely floating exchange rates — are the only viable exchange rate regimes (the so called "hollowing out" hypothesis). However, a closer inspection shows that this association between regimes and performance may actually reflect reverse causation, that is, a relationship that runs from the macroeconomic conditions of the country to the choice of an appropriate exchange rate regime rather than in the opposite direction. This does not exclude that exchange rate policy may play an important role in maintaining conditions of sustainability of economic growth.

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1. Introduction[1]

Is there a relationship between exchange rate regimes and macroeconomic targets, such as inflation and growth? If so, which is preferable: a floating exchange rate, which can absorb external shocks by allowing the government to pursue independent fiscal and monetary policy, but at the same time exposes the country to the turbulence and volatility of exchange rates, disrupting firms' production and investment decisions; or a fixed exchange rate, which counters inflation but also eliminates an important adjustment mechanism, namely an autonomous monetary policy?

This topic can be analysed from many angles. I shall consider it from the standpoint of a single country, Italy, from national unification in 1861 to 1998, just before the adoption of the euro, evaluating the pros and cons of alternative exchange rate policies. The Italian experience is of additional interest as a case study of catching-up.

Several new aspects are introduced in my study. First, even though the analysis for a single country may appear limited, it allows a deeper investigation of the idiosyncratic aspects of a general phenomenon that has already been widely examined. "Close-up evaluations of the individual countries' experience provide a much keener guide as to the dynamics and ultimate outcome of the policy choice" (Quirk 1999, p. 87). Second, I use a *de facto* classification that groups exchange rate regimes according to the actual behaviour of relevant variables, instead of simply considering the exchange rate arrangements officially declared. This kind of classification has been carried out only for more recent periods and in any case, to the best of my knowledge, not for Italy. Third, for the first time, a principal component analysis is used to obtain a composite indicator of the exchange rate policy *de facto* pursued by the monetary authorities.

The analysis also makes use of information gathered from historical archives and Italian historical literature. The main findings of the paper are the following:

[1] The author thanks Forrest Capie, Filippo Cesarano, Stefano Fenoaltea, Juan Carlos Martinez Oliva and an anonymous referee for their very helpful comments and suggestions. The opinions expressed in this paper do not involve the Bank of Italy in any way.

1) There exists a significant link between exchange rate regimes and inflation and growth performance in Italy.

2) Italy seems to have performed best, in terms of high output growth rate, under "soft peg" regimes, for example when the exchange rate was *de facto* pegged but the authorities were not legally committed to a fixed exchange rate or when rates were fixed but capital controls gave the authorities the opportunity to pursue independent macroeconomic policies.

3) This last result is at odds with recent literature according to which corner solutions — hard pegs or freely floating exchange rates — are the only viable exchange rate regimes.

4) A deeper investigation reveals, however, that the causal link between regimes and performance runs from the economic conditions of the country to the choice of the exchange rate regime rather than in the opposite direction.

5) The exchange rate helps to maintain conditions of sustainable economic growth.

In next section, I discuss the theoretical issues concerning the link between the exchange rate regime and economic performance. Section 3 presents the *de facto* classification used in the paper. Section 4 looks at the relation between regimes and inflation. Section 5 discusses the relationship between regimes and output growth. Section 6 offers some concluding remarks.

2. Exchange rate regimes and economic performance: a review of the literature

2.1 Historical experience and theoretical issues

From the end of the nineteenth century to the outbreak of World War I the gold standard prevailed. Convertible regimes, such as the classical gold standard, are traditionally considered to ensure price stability in the long-run. According to the Humean price-specie flow mechanism, under the gold standard balance-of-payment deficits and surpluses were automatically adjusted, through arbitrage, by flows of gold from countries with deficits to

countries with surpluses, keeping the domestic money supply and price levels in line (Bordo and Schwartz 1999).

After World War II the dominant view was that the inter-war currency experience had been a financial disaster, that the floating exchange rate experience of the 1920s was characterised by destabilising speculation and instability, and that "short term capital flows were destructive in the 1930s" (Bordo and James 2001, p. 3). This view, which Ragnar Nurske (1944) summarised in an influential study for the League of Nations and that was behind the Keynes and White plans for international monetary reform, led to the adoption of a system based on capital controls and adjustable pegs, and to the rejection of what today would be called "corner solutions," i.e. hard pegs (like the gold standard) or pure floating exchange rate regimes.

The flaws of the Bretton Woods system emerged during the 1950s and 1960s. They were principally due to the fact that even with pervasive controls on capital movements, capital could be legally moved "through manipulating the 'leads and lags' of commercial payments and other loop-holes in the control system" (Cooper 1999, pp. 8-9) or could move illegally. Consequently, the authorities imposed increasingly tight controls on all international transactions, "thus thwarting the very purposes for which a well-functioning payments system is desired" (Cooper 1999, p. 9). This excessive rigidity and the increasing expansion of international capital movements led to a case for generalised floating, a point that Friedman had already made in 1953, though at that time his was an isolated position.

In the meantime Mundell (1961, 1963) developed a theory of optimal currency areas in which he described the conditions for the correct functioning of a system based on a common currency (and, more generally, of a system of fixed exchange rates). In his seminal work, he highlighted two contrasting aspects of fixed exchange rates: on the one hand, they facilitate trade in goods and services; on the other, they preclude the use of independent monetary policies for pursuing domestic objectives. However, according to Mundell, monetary independence may not be necessary if the shocks hitting the economies of the currency area are symmetric or, when the shocks are asymmetric, if labour mobility is sufficiently high and workers of the country in recession can move across the border to get jobs. Building on Mundell's work, McKinnon (1963) and Kenen (1969) stressed the

importance of other variables for the exchange rate regime choice: size and openness the former, the degree of specialisation of a country the latter.[2]

Following Poole's (1970) analysis of monetary policy instruments, a series of successive studies (Boyer 1978; Henderson 1979; McKinnon 1981) focused on the characteristics of the dominant shocks hitting an economy. According to their findings, fixed exchange rates perform better in terms of output stability in the face of domestic monetary shocks since money supply automatically adjusts to accommodate changes in money demand without involving the real side of the economy, while flexible rates perform better in the face of external shocks or domestic real shocks as they allow relative prices to move in order to reallocate resources. Hence, with relatively closed capital markets, domestic monetary shocks are more important and fixed exchange rates should perform better. By contrast, with integrated financial markets the crucial factor is the role that the exchange rate can play as an absorber of external shocks or as a shield against speculative attacks (Levy-Yeyati and Sturzenegger 2001).

In the 1980s, in a context of still relatively closed capital markets, the theoretical literature, building on Barro and Gordon's (1983) work on monetary policy credibility, "concentrated on the trade-off between monetary independence and credibility implied by different exchange rate regimes" (Levy-Yeyati and Sturzenegger 2001, p. 62). The position taken was that exchange rate pegs helped to import credibility from a low-inflation anchor country (Giavazzi and Giovannini 1989).

Recently, "given the increasing importance of international capital flows and the predominance of external over domestic monetary shocks, the traditional trade-off has narrowed down to a price stability-growth dilemma" (Levy-Yeyati and Sturzenegger 2001, pp. 62-63). The currency crises of the 1990s (Mexico, South-East Asia, Russia, Brazil, Argentina) have showed that fixed exchange rate regimes, when combined with high capital mobility, are exposed to speculative attacks. That is why recent studies affirm that the only

[2] According to McKinnon, exchange rate uncertainty can constitute a serious problem for a small and open country, where trade accounts for a large proportion of the economy. Kenen argued that specialisation tends to diversify countries in the same currency area, so that they are affected differently by a common shock.

viable solutions are hard pegs (like currency unions or currency boards) or pure floating exchange rates, the so called "hollowing-out" hypothesis.

In the following sections I will summarise the principal conclusions that the recent literature has drawn on the link between exchange rate regimes and inflation and growth.

2.2 Exchange rate arrangements and inflation

Theoretically, a pegged exchange rate can reduce domestic inflation pressures, whether they originate in excessive government budget deficits or in wage and price setting by the private sector, through a "discipline" and a "credibility" effect.

A fixed rate can lower inflation by inducing greater policy discipline. It represents a highly visible commitment that raises the political cost of loose monetary and fiscal policies, allowing the government to resist the temptation of monetary and fiscal laxity (Obstfeld and Rogoff 1995; Ghosh et al. 1996, 1997). This was the case of gold standard, when "obligation to maintain convertibility served as a check on inflationary finance" (Eichengreen and Flandreau 1997, p. 13). In this view, the exchange rate represents a "nominal anchor" for monetary policy (Bernanke, Mishkin, Laubach and Posen 1999).

Lowering inflation through a fixed exchange rate would carry a cost in terms of higher unemployment and lower output, owing to the restrictive policies followed in order to maintain that rate. However, according to the "credibility hypothesis," if the exchange rate is credible, the cost would be reduced. The use of the exchange rate as a nominal anchor can discipline private agents too by changing their expectations, thereby lessening the cost of attaining a low-inflation equilibrium (Dellas, Swamy and Tavlas 2002, p. 56; Corden 1994).

In addition, pegging the exchange rate can also lower inflation by producing a "confidence effect," i.e. a greater willingness to hold domestic currency rather than goods or foreign currencies, thus diminishing the inflationary effects of a given monetary expansion (Ghosh et al. 1996, 1997).

On the other hand, even though floating rates may lead governments to pursue inflationary policies since they do not have to worry about losses of foreign reserves, pro-

floaters claim that a floating exchange rate would keep inflationary disturbances within the country where the disturbances originated. "It would then be up to its voters, if they wished, to elect a government with better policies" (Krugman and Obstfeld 2000, p. 54).

Moreover, under floating rates, expansionary macroeconomic policies can produce sudden and unwanted movements in exchange rates that represent an immediate and observable signal of fiscal indiscipline and can, in turn, impart discipline, whereas under fixed rates reserve changes usually become public after some delay and can be concealed (Tornell and Velasco 2000; Dellas, Swamy and Tavlas 2002).

2.3 Exchange rate arrangements and growth

Compared with the ample literature on nominal effects of the exchange rate regime, the number of studies investigating the effects of the exchange rate regime on economic growth is relatively modest.[3]

The exchange rate regime can affect output growth "either through the rate of factor accumulation (investment or employment growth) or through the growth rate of total factor productivity" (Ghosh et al. 1997, p. 19).

Pegged exchange rates can foster investment because they reduce policy uncertainties, lower real interest rates and limit exchange rate volatility. On the other hand, by eliminating an important adjustment mechanism, they can intensify protectionist pressure and therefore diminish the efficiency of a given stock of capital, insofar as the external trade is associated with higher productivity. Furthermore, pegged rates may distort price signals in the economy by creating misalignments of the real exchange rate which prevent the efficient allocation of resources across sectors (Ghosh et al. 1996, 1997).

However, the main problem with a fixed exchange rate regime is that monetary policy is devoted to the external objective and cannot be used for output stabilisation, so that costs

[3] Among others: Aizenman (1991), Mills and Wood (1993), Mundell (1997), Ghosh et al. (1997), Bordo (1998), Bordo and Schwartz (1999), Levy-Yeyati and Sturzenegger (2001, 2002b), Reinhart and Rogoff (2002), Bordo (2003).

could arise in terms of high real output variability (Obstfeld and Rogoff 1995). Furthermore, it is hard to ascertain whether a chosen rate is optimal or sustainable (Latter 1996). In any event the rate must be credible, which is why the prevailing view about fixed exchange rates, for countries open to capital flows, prescribes the use of "hard pegs," i.e. currency boards or monetary unions (Fischer 2001) (see Section 2.4 below).

Under floating rates, monetary policy is free to pursue domestic objectives (Quirk 1999; Latter 1996), in particular to promote economic growth. Floating exchange rates may also foster productivity growth to the extent that protectionist measures are reduced under this regime and that external trade is associated with higher productivity (Ghosh et al. 1996, 1997, 2003).

However, given that "markets seldom operate with perfect efficiency," there is a risk of overshooting if the floating exchange rate moves toward a level not consistent with economic fundamentals (Latter 1996, p. 8). Moreover, under floating rates "turbulence and volatility in international financial markets disrupt firms' production and investment decisions" (Eichengreen and Flandreau 1997, p. 1). "Exchange-rate uncertainty reduces international trade, discourages investment, and compounds the problems people face in insuring their human capital in incomplete asset markets" (Obstfeld and Rogoff 1995, p. 6). It may be possible to insure or hedge against the uncertainty on the future path of the exchange rate through the derivative markets but this involves a cost (Latter 1996).

2.4 Recent developments: the "hollowing out" hypothesis, "fear of floating," "fear of pegging"

The "hollowing out hypothesis" (Eichengreen 1994), or "bipolar view" or "two-corner solution," as it has also been called (Fischer 2001), asserts that, in a world of capital mobility, the only sustainable exchange rate regimes are freely floating rates and hard pegs: "there is little, if any, comfortable middle ground between floating rates and the adoption by countries of a common currency" (Obstfeld and Rogoff 1995, p. 2).[4] This theory of exchange

[4] See also Goldstein (1999) and Summers (1999) for related arguments.

rate regimes has been developed after a number of emerging markets adopting, in the 1990s, intermediate exchange rate regimes (with open capital markets) "were swept away in crises" (Williamson 2002, p. 73), and it "is based on the observation that higher capital mobility makes exchange rate commitments increasingly fragile" (Masson 2000, p. 3).

The hypothesis of the gradual disappearance of intermediate regimes and the non-viability of soft pegs has a theoretical explanation in the principle of the "impossible trinity," according to which we cannot simultaneously have fixed exchange rates, financial market integration and an autonomous monetary policy dedicated to domestic goals (Fischer 2001; Frankel 1999). Moreover, some countries are lacking in what Bordo and Flandreau (2001) have suggested to call "financial maturity." Today, as at the time of the gold standard, many peripheral countries, in order to obtain foreign capital necessary for their development, have to borrow in terms of strong foreign currencies (under the gold standard, in terms of core country currencies or with gold clauses), as stated by the doctrine of the "Original Sin" (Bordo and Flandreau 2001; Fischer 2001). Hence "the peripheral countries then, as now, were forced to adopt super hard fixed exchange rate … because they had not developed the financial maturity to float, or else they had to restrict foreign borrowing" (Bordo and Flandreau 2001, p. 6).

On the other hand, some scholars argue that floating rates, autonomous monetary policy and freedom of capital movements may also be incompatible "at least for countries with small and poorly developed capital markets" (Cooper 1999, p. 21). For such countries, the exchange rate represents the principal asset price and "it will be jerked around by changes in portfolio sentiments" (Cooper 1999, p. 23). In an open economy ample and sharp swings in asset prices and, as a consequence, exchange rates can disrupt the goods and services markets, since exchange rate risks cannot be hedged in poorly developed financial markets.

Calvo and Reinhart (2002) have also affirmed that lack of credibility can lead to what they call "fear of floating," i.e. an officially declared float but *de facto* intervention in the market in order to stabilise the exchange rate. In fact, lack of credibility may give rise to liability dollarization and limit the central bank's ability to act as an effective lender of last resort, all of which feeds this fear of large exchange rate swings. Hence policy makers tend

to stabilise the exchange rate, allowing for some volatility in interest rates and pursuing procyclical interest rate policies.

Levy-Yeyati and Sturzenegger (2001) have identified a phenomenon that they have called "fear of pegging," i.e. running a *de facto* peg but avoiding to officially commit to a fixed parity. The rationale for this course is that a legal commitment to a fixed exchange rate exposes countries with low credibility to external shocks and speculative attacks that can undermine growth performance. "Important factors that reduce the risk of speculative attacks are the availability of foreign currency reserves to defend a fixed exchange rate, and the consistency of macro economic policies" (Von Hagen and Zhou 2002, p. 10). However, these features often are not sufficient to prevent such attacks. Accordingly, some countries maintain a peg in order to avoid the problems associated with having foreign currency liabilities while at the same time seeking to reduce speculative attacks by not officially committing to maintain the parity. Analysing 154 countries over the period 1974-1999, Levy-Yeyati and Sturzenegger (2001) find that "compared with de facto floats, de facto pegs that shy away from legally committing to a fixed exchange rate benefit from higher growth performance, providing a justification for the 'fear of pegging' " (p. 65).

3. Classifying exchange rate regimes in Italy

In this section I try to identify the regimes actually adopted in Italy in the long period under examination. The problem of the consistency between the actual behaviour of a central bank and its announced objectives has been the subject of many studies. Sometimes a substantial consistency between them has been found: Giucca and Martinez Oliva (1990), for example, analysing the Bundesbank's behaviour by empirically estimating the monetary authorities reaction function, confirm the traditional view of a strongly anti-inflationary German central bank.[5] However, as has been recently demonstrated, especially for emerging market countries, this often is not true with regard, in particular, to the exchange rate policy. In other words, the exchange rate arrangements officially declared do not represent actual

[5] Yet the period covered by their analysis is quite short.

practice (Calvo and Reinhart 2002; Levy-Yeyati and Sturzenegger 2001; Ghosh et al. 1996; Ghosh et al. 1997; Frankel 1999; Frieden, Ghezzi and Stein 2001; Quirk 1994). "Many countries that claim to be floaters intervene heavily in exchange rate markets to reduce exchange rate volatility, suggesting a mismatch between de jure and de facto regimes" and "countries that run a de facto peg … avoid an official commitment to a fixed parity" (Levy-Yeyati and Sturzenegger 2001, p. 63). Even though a *de facto* classification may have shortcomings,[6] I will attempt to construct one by identifying the actual regimes adopted in Italy from its unification to the advent of the European Monetary Union. To do this, following Calvo and Reinhart (2002), Levy-Yeyati and Sturzenegger (2002a) and Reinhart and Rogoff (2002), I will analyse the actual behaviour of exchange rates, foreign exchange reserves and interest rates. First, however, I will sketch the evolution of exchange rates, reserves and the discount rate in order to obtain a preliminary picture of the exchange rate regimes that Italy has had. For a description of data used in this paper, see the appendix.

3.1 Stylised facts on exchange rate regimes in Italy

Initially the key instrument of exchange rate policy was the discount rate.[7] Reserves were an ancillary tool; extensive use of them for exchange rate control was allowed only from 1903 (Ciocca 1978, p. 211).

Post-unification Italy adopted a bimetallic system, inherited from the Kingdom of Sardinia. Figure 1a shows how Italy was committed to maintain convertibility until 1866. Some variability of reserves is associated with a stable exchange rate, and the monetary authorities did not hesitate to raise the discount rate when necessary, as in 1864, when the markets were agitated.

In 1866 the war against Austria induced Italy to suspend convertibility, *de facto* and *de jure*. A clear change of regime occurred, with the lira weakening against all main currencies.

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[6] The main problem lies in the fact that "it fails to reflect the commitment of the central bank to intervene in the foreign exchange market" (Domaç, Peters and Yuzefovich 2001, p. 17).

[7] However, given the structure of the Italian financial market, the authorities did not consider the discount rate a very effective instrument to attract foreign capital (Ciocca 1978).

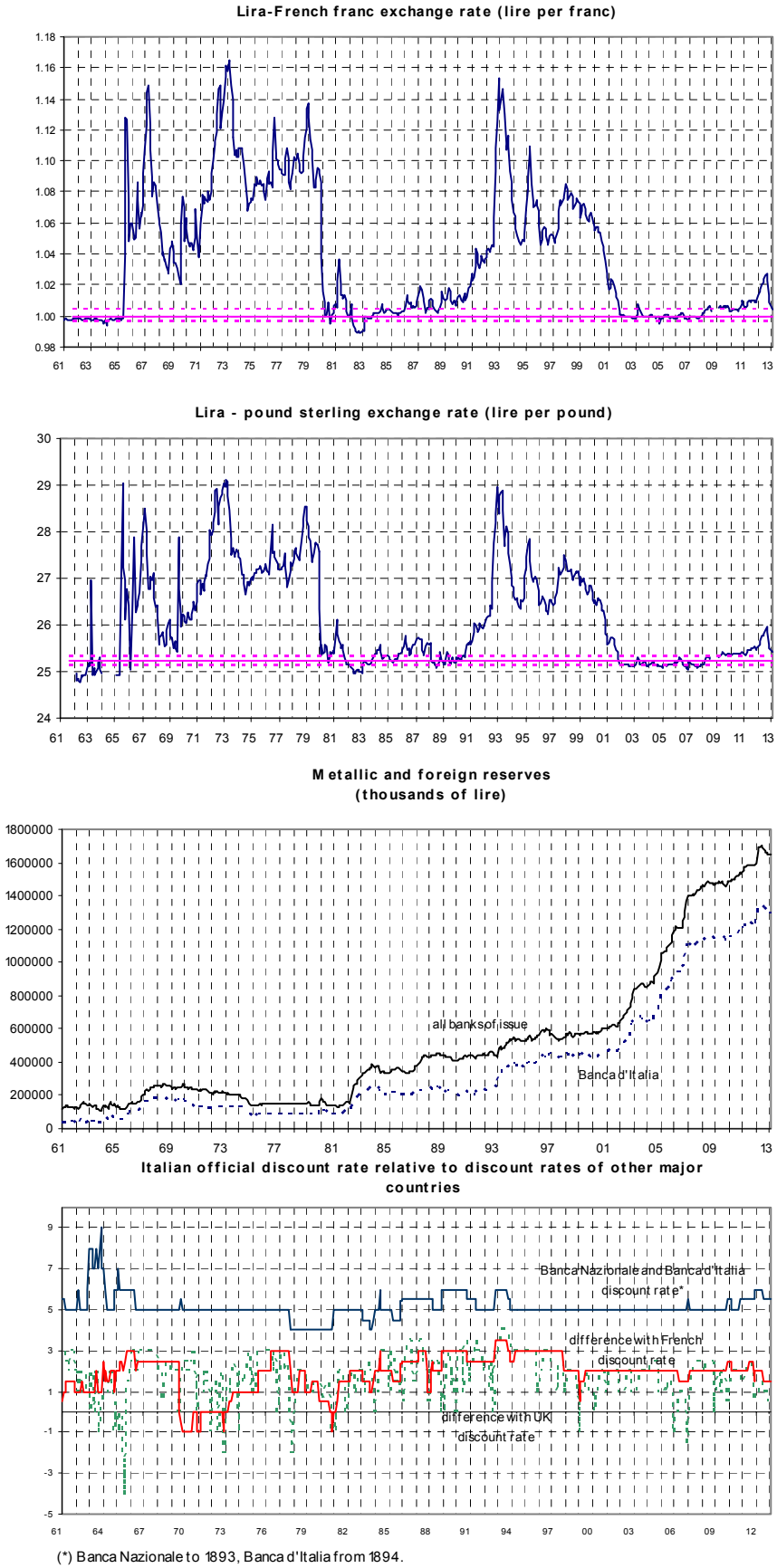
Although convertibility was not restored until 1883, there were clear signs of attempts to control the exchange rate beginning in 1868-1869 when reserves turned downwards and the exchange rate strengthened considerably. This change in trend behaviour could be traced to the fact that Italy had joined the Latin Monetary Union in 1865,[8] and reflect the government's desire to curb the export of silver "subsidiary" money from Italy to member countries of the Union that had taken place after the suspension of convertibility.[9]

Reserves trended downwards from 1868-1869 to 1875. Afterwards they remained stable until the restoration of convertibility in 1883.

[8] As a consequence of the rise in the price of silver, due to discovers of gold in California and Australia in the late 1840s, in bimetallic countries silver coins were removed from circulation. Some countries reacted by producing "subsidiary" silver coins whose metallic value was considerably less than the coin's face value. The metallic value of these coins differed from country to country and the silver coins whose metallic value was higher were removed from circulation and melted. In December 1865 France, Belgium, Italy and Switzerland agreed to form the Latin Monetary Union: they stated standard denominations of gold and silver coins for Union members, guaranteed the acceptability of each member's coins in settling public and private payments in all member states and attempted to constrain the coinage of silver coins to a reasonable amount based on each country's population (Roccas 1990).

[9] In fact, Italian silver coins could be exchanged in the other countries of the Union for an amount of gold that could buy in Italy, thanks to the golden premium, more inconvertible banknotes than those corresponding to the nominal value of the exported silver coins (Roccas 1990, p. 10).

Figure 1a – Exchange rates, reserves and discount rate (1861-1913)



(*) Banca Nazionale to 1893, Banca d'Italia from 1894.

The discount rate was raised by Banca Nazionale in 1870, but the difference between the Italian and the French discount rates diminished after 1870. It gradually increased during the 1870s. The exchange rate weakened from 1870 until the crisis of 1873, strengthened appreciably in 1874-1875, and then reverted to its declining trend. From 1876, the impression is that the monetary authorities allowed the exchange rate to weaken gradually, using the discount rate (not lowering it and so increasing the difference with foreign discount rates, in the second half) to control the pace of depreciation.

The announcement of the imminent restoration of convertibility caused a strong appreciation of the lira in 1880-1881 but this was more the effect of speculative capital movements (made possible by the availability of British capital)[10] than the result of the improved credibility of the country. This is shown by the short depreciation of 1882, probably caused by the uncertainty that followed the initial enthusiasm, and by the difficulty of maintaining convertibility (restored in 1883) in the mid-1880s. Reserves (increased in the early 1880s by the proceeds of international loans contracted by the authorities for the restoration of convertibility) fell from the end of 1884 to 1887, when convertibility was *de facto* suspended. The monetary authorities nonetheless remained committed to maintaining a *de facto* peg. This is shown by the continuous reduction in reserves (after the short rise of 1888) until the end of 1890, when the commitment to a fixed parity seems to have definitively vanished, as is demonstrated by the depreciation of the lira, the increase in reserves, and the behaviour of the discount rate and its differential vis-à-vis the French discount rate (both rates decreased in 1891). The discount rate was raised at the end of 1893 but only to face the well-known crisis of 1893-1894.

After the suspension of convertibility in 1894, data suggest that the control of the exchange rate was limited to reducing sudden and sharp fluctuations: reserves decreased in 1895, in 1896, and between the second half of 1897 and the first half of 1898, but the discount rate and the difference with the French discount rate remained unchanged. Between the end of 1898 and the end of 1902 the exchange rate strengthened, but the data suggest that this was due to other factors than a strong commitment to restore the parity: reserves show an increasing trend, the official discount rate remained unchanged, the difference between

[10] See Fenoaltea (2003a; 2003b).

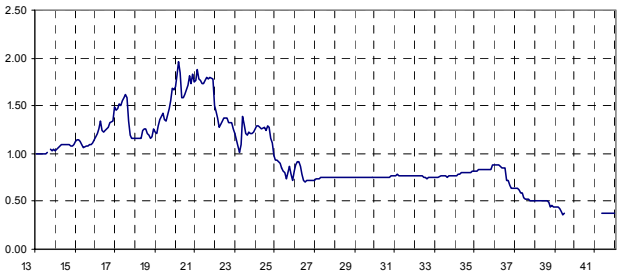
the Italian official discount rate and the French discount rate decreased after 1898. This does not mean that a commitment to a fixed exchange rate was not among the objectives of the monetary authorities given that the exchange rate was maintained between the gold points from 1902 to 1907. Moreover, we see a decrease of reserves in 1904. As I remarked earlier, the need of undeveloped countries to borrow abroad constituted a major reason for maintaining the link to gold, but only to the extent that this objective did not contrast with other internal objectives. In fact, from 1909 we see a progressive weakening of the exchange rate, even if it was still controlled, as is shown by the decreases in reserves in 1909, in 1910 and, more sharply, in 1913, and by the increase in the discount rate. The fact that convertibility was not restored even when the parity was reached suggests that the behaviour of the monetary authorities was characterised by what has been recently called "fear of pegging," "namely the practice of *de facto* running a peg while avoiding a commitment to a fixed parity and the potential vulnerability to attacks that a legal peg may introduce" (Levy-Yeyati and Sturzenegger 2001, p. 83), a pattern that Levy-Yeyati and Sturzenegger (2001) have found in many countries in more recent periods (see Section 2.4). "This 'fear of pegging' may be related … with the fact that, as capital mobility increases, official pegs are more likely to be targets of speculative attacks that, given the economic (and political cost) of a currency crisis, may discourage governments from overtly assuming a commitment with a predetermined parity" (Levy-Yeyati and Sturzenegger 2002a, p. 14). This seems to be the case of the Italian exchange rate policy in the early years of last century.

With the outbreak of the First World War the convertibility of the currency was suspended by many countries. Italy, not formally committed to maintaining the parity, appears to have continued with the same policy (see Figure 1b).

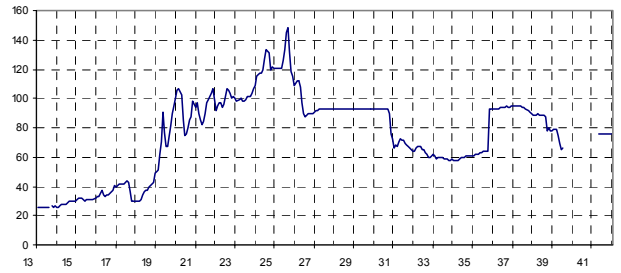
In 1917 exchange controls were introduced. From the second half of 1918 the USA intervened on the foreign exchange markets and granted loans in order to support the lira. In March 1919 Allied support ended and with the elimination of most of the exchange rate controls in May 1919 the lira strongly depreciated. A floating exchange rate regime seems to emerge, as also pointed out by Cotula and Spaventa (1993, p. 24). In 1921 the exchange rate tended to stabilise even though it remained highly volatile. Between 1921 and 1925 it weakened further. Reserves trended downwards throughout the period.

Figure 1b – Exchange rates, reserves and discount rate (1914-1942)

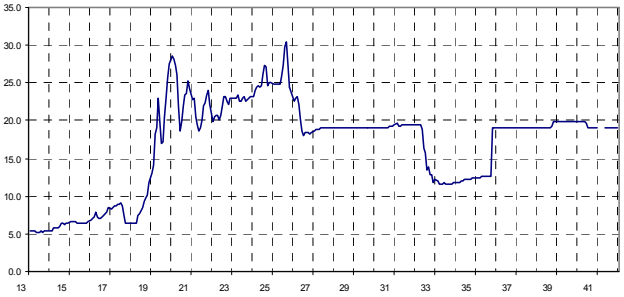
Lira-French franc exchange rate (lire per franc)



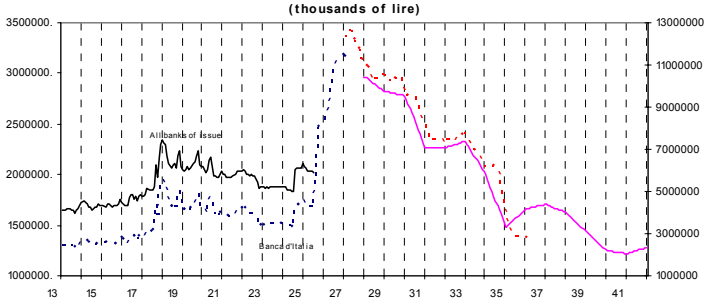
Lira - pound sterling exchange rate (lire per pound)



Lira - US dollar exchange rate (lire per dollar)

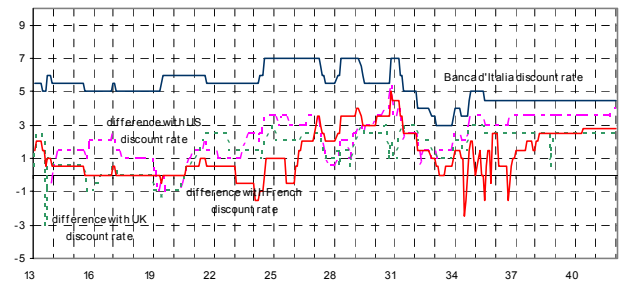


Metallic and foreign reserves*
(thousands of lire)



(*) Due to change in evaluation criteria at the end of 1927, the scale from 1913 to 1927 is the left-hand scale; from 1927 the scale is the right-end scale. The line starting in 1928 reports annual data from Bancad'Italia (1993).

Banca d'Italia official discount rate relative to discount rates of other major countries



After 1921 the residual exchange controls were eliminated and the official discount rate was lowered in 1922; the difference with the French official discount rate reached a minimum at the beginning of 1925. Hence the impression is that in this period the exchange rate was not a major objective of monetary authorities: there were attempts to stabilise it, but they failed and the exchange rate regime that actually prevailed was in effect a managed float.

After the crisis of 1925 the government was determined to stabilise the lira, as is evidenced by archival documents (see Cotula and Spaventa 1993, for a selection). Exchange controls were reintroduced and a loan in dollars aimed at stabilising the lira was negotiated. Reserves decreased from the second half of 1925 and the discount rate was raised twice in June. While it is true that lira, after strengthening at the end of 1925, plummeted in the first half of 1926 and more drastic measures of stabilisation were adopted in 1926 and 1927 that led to the full restoration of convertibility at the end of 1927, a change of regime, in terms of the attention paid to the exchange rate as policy objective, seems to have occurred starting in the second half of 1925.[11]

The period from the end of 1927 through 1934 can be considered as a *de facto* and *de jure* peg. In this period we see a decreasing trend of the reserves, with significant losses especially in 1928-1929, the second half of 1931 and 1934-1935. The discount rate was lowered in 1928, raised again in the first half of 1929 and reduced in 1930. In March 1930 full capital mobility was restored. The exchange rate remained stable. However, after the pound devaluation in September 1931, according to De Cecco (1993, p. 101), as cited by Sorrentino (1999, p. 5), the "Italian authorities tried … to protect their reserves by widening the lira fluctuation band against the dollar well beyond the gold points." They also raised the discount rate. Yet they continued their policy of *de facto* pegging. In 1932 and 1933 the discount rate was reduced, as was the difference with the French official discount rate, in order to facilitate the conversion of consolidated debt, but this contributed to the rapid loss of

[11] The increase in reserves observed in 1926-1927 depends in part on the fact that in mid-1926 Banca d'Italia became Italy's only bank of issue and acquired the reserves of Banco di Napoli and Banco di Sicilia. It was also due to capital inflows determined by expectations of revaluation of the lira and to the interventions on the market by the authorities, aimed at slowing the appreciation of the currency and increasing the reserves by selling lire, as explicitly stated by the Director General of Banca d'Italia, Bonaldo Stringher, in a letter of 4 July 1927 to the Director General of the Treasury, Vincenzo Azzolini (reported in De Cecco 1993, p. 987).

reserves observed from the beginning of 1934. From 1931 through 1934 measures were gradually adopted to limit commercial and foreign exchange transactions. In 1934 the change of regime was completed: capital outflows were forbidden and, in December, strict foreign exchange control was introduced. Under gold exchange standard, this was tantamount to a *de facto* suspension of convertibility (Gelsomino 1992, p. 104). The discount rate was raised but these actions did not avert the continuous deterioration of the exchange rate. The continuous loss of reserves led to the introduction in 1935 of other measures such as the suspension of reserve requirements, the monopoly in gold foreign transactions and a government takeover of foreign exchange management. In October 1936 the lira was finally devalued and the reserves increased.

The monopoly in foreign exchange transactions was maintained unchanged until 1946, when it was attenuated by the introduction of accounts that allowed exporters to use 50 per cent of the currencies obtained in their transactions for payments abroad or for foreign exchange transactions and a partial delegation to the banks of some foreign exchange operations.[12] Moreover, about 40 per cent of transactions were settled through clearing agreements (Asso, Biagioli and Picozza 1998). Hence there existed different rates: the export rate, the official rate and the rate used in bilateral clearing operations. In this first period the exchange rate regime appears to be a *de facto* managed floating regime.[13]

The official exchange rate with the US dollar, fixed in 1943 at 100 lire, was raised at the beginning of 1946 to 225 lire[14] and in August 1947 to 350 lire. In November 1947 measures were adopted that led to the unification of the exchange rate market. The exchange rate was stabilised at 575 lire per dollar. The reserves declined in 1947 but the stabilisation of the exchange rate with the dollar at a realistic level caused their "spectacular" improvement between 1948 and 1949 (Gelsomino 1998, p. 282) (see Figure 1c).

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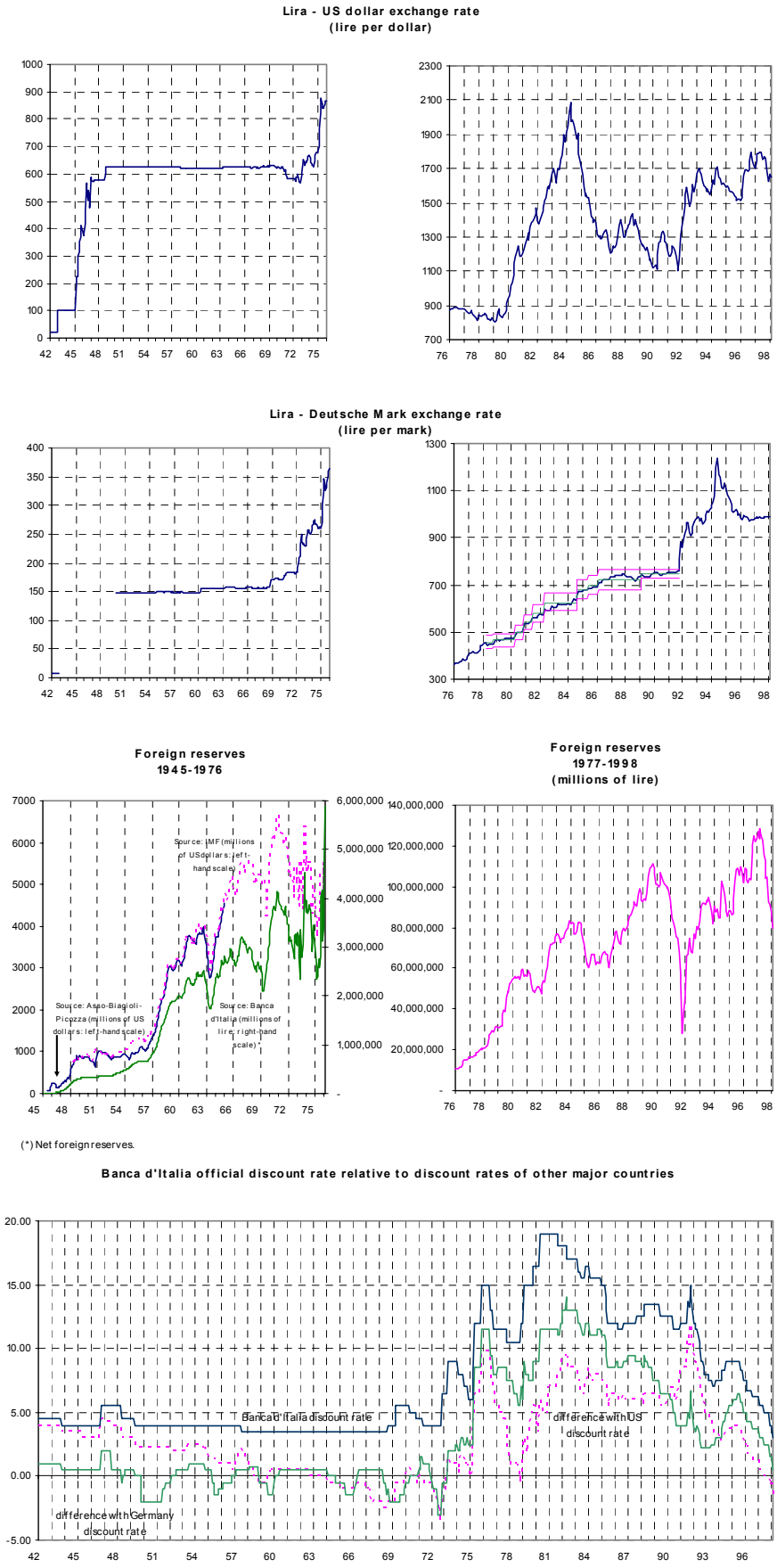
[12] Only after 1955-1956 could exporters use 100 per cent of the foreign currencies obtained on sales abroad and banks buy and sell foreign currency (with the obligation of matching credit and debit positions).

[13] This kind of policy, at odds with the principles of the Bretton Woods agreements, was criticised by the International Monetary Fund, which in 1947 stated that "multiple currency practices involving floating exchange rates are more harmful than those with fixed exchange rates" (cited in Asso, Biagioli and Picozza 1998, pp. 111-12).

[14] In fact, the exchange rate remained formally unchanged at 100 lire, but a surcharge of 125 per cent was applied.

Figure 1c – Exchange rates, reserves and discount rate (1943-1998)



From 1949 to 1971 the exchange rate remained stable at 625 lire per dollar,[15] the convertibility of the lira was restored in 1960 with the declaration of its official parity to the International Monetary Fund. The accumulation of reserves that we see in many years of this period was necessary to keep the exchange rate stable when necessary, as during and after the Korean crisis. Even during the crisis of 1963-1964 the parity of 625 lire per dollar could be maintained unchanged thanks to the availability of abundant reserves, which were drawn on during the crisis. From 1950 to 1969 the official discount rate was changed only in 1958, when it was lowered.

In 1971 the dollar became inconvertible. After a short period of a dollar standard (Smithsonian agreements) and an attempt to link the European currencies (Monetary Snake), Italy introduced a fixed exchange rate for current account transactions and a flexible rate for financial transactions. In 1973 the fixed rate for current account transaction was abolished and Italy had a flexible exchange rate until 1979, when it joined the European Monetary System. However, after the currency crisis of 1976 a significant change in the orientation of macroeconomic policies occurred. In the years 1977-1978 the exchange rate was one of the main objectives of monetary policy aimed at reducing imported inflation and avoiding a fall in competitiveness (Masera and Rossi 1993). The weakening of the lira-dollar exchange rate in nominal terms was less pronounced than that of the lira-mark rate, reflecting, according to Masera and Rossi (1993), the aim of the authorities to reduce the price of imports (mostly denominated in dollars) in relation to the price of exports (mainly originated from EEC countries).

In March 1979 Italy joined the European Monetary System, obtaining wider margins of fluctuations around the central rate (± 6 per cent) than those prescribed for the majority of the participating countries (± 2.25 per cent).

As pointed out by Rossi and Gaiotti (2003), after 1980 the exchange rate became a major objective of the monetary authorities, offering a clear example of time-consistent monetary policy. In spite of several realignments of the central rate in the EMS, the exchange rate was managed in such a way that the real exchange rate strengthened (Rossi

[15] In September 1949 the pound depreciated by 30 per cent with respect to the dollar. The lira depreciated too, but only by 9 per cent, to 625 lire per dollar (Gelsomino 1998, p. 282).

and Gaiotti 2003). In this period there was a reduction in the reserves in 1982 and 1985-1986. The discount rate was raised in 1979, 1980 and 1981, when it reached its maximum value. The maximum differential with the German discount rate was reached in 1983. Afterwards, with the oil counter-shock, the discount rate (and its differential) decreased (with a temporary increase in the second half of 1984) until August 1987, when it was raised again. Further increases followed in 1988 and 1989. Between the second half of 1987 and the first half of 1990, a substantial increase in the reserves was recorded.

In January 1990 Italy entered the narrow band (± 2.25 per cent) of the EMS. This period was characterized by a strong commitment to maintain the exchange rate fixed. The reserves followed a decreasing trend from the second half of 1990 that culminated in the collapse leading to the crisis of September 1992. The discount rate decreased from May 1990 until the end of 1991, when it turned upwards (with a temporary reduction in August 1992), reaching a peak in September 1992.

After the September 1992 devaluation and the temporary suspension of the lira's participation in the Exchange Rate Mechanism of the European Monetary System, a changeover to a managed float took place. The reserves increased and the discount rate was lowered. The discount rate rose in 1994 and again in 1995 when a new crisis hit lira. From 1996 the lira-mark exchange rate stabilised and the lira was again pegged *de facto* and *de jure* to the Deutsche Mark. The reserves increased from 1996 until 1998, when, in the run-up to the formation of monetary union and the adoption of the euro as a single currency, a sizeable reduction occurred.

3.2 A "de facto" classification

In order to confirm the indications formulated in the previous section and more precisely define the end of a regime and the beginning of another, I will carry out statistical analyses based on monthly data for the exchange rate and other variables that shed light on the actual behaviour of the monetary authorities in managing the exchange rate.

More specifically, the new classification that I propose is based on statistical analyses of monthly data for the exchange rate, reserves and differences between Italy's official

discount rate and those of other countries. The selection of these variables is based on a textbook definition of exchange rate regimes: fixed exchange rate regimes are characterised by significant changes in reserves aimed at reducing the volatility of the nominal exchange rate while flexible regimes should be associated with considerable volatility of nominal exchange rates and relatively stable reserves. Moreover, fixed regimes should present a frequent adjustment of the discount rate in response to the discount rate changes of other countries in order to maintain the exchange rate stable.

Though other variables could be relevant for the analysis, only those mentioned above are available for the whole period considered in the study.

In particular, the idea is to represent the exchange rate regime through a composite factor obtained by running a principal component analysis on the absolute monthly percentage changes in the nominal Italian lira-French franc, Italian lira -US dollar, Italian lira -pound sterling, Italian lira-Deutsche Mark exchange rates,[16] on the absolute percentage changes in official metallic and foreign reserves and on the absolute changes in the difference between the Italian official (maximum) discount rate and the discount rate of the main reference country in each period.[17]

Principal component analysis has already been applied to a set of time series by other authors in order to obtain a measure of economic activity (Gerlach and Gerlach-Kristen 2002) or a composite indicator of inflation expectations (Gaiotti 2000). Here the objective is to obtain an indicator of the exchange rate regime *de facto* followed by the authorities.

Once I have obtained this "exchange rate regime variable," I run a cluster analysis on it in order to group months that are homogeneous in terms of this factor, thus obtaining a classification of regimes entirely based on data.

Data on reserves are not available from 1936 to 1945. The analysis therefore will not cover that period.

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[16] Given the importance for Italy of the French franc in the periods preceding the Second World War and the greater importance of the Deutsche Mark in the subsequent period, in the principal component analysis I will use the former up to 1945 and the latter thereafter.

[17] France up to the Second World War, the US from 1945 to 1971 and Germany from 1971 to 1998.

3.2.1 Principal components analysis

I apply principal components analysis to z-normalised data. I do not eliminate outliers so as not to lose relevant information. I use the second component as an indicator of the exchange rate regime. The choice of the second factor as representative of the *de facto* regime depends on the fact that, as can be seen from Table 1, it is highly positively correlated with foreign reserves variability and the difference between the Italian discount rate and the foreign discount rates and negatively correlated with the absolute percentage changes in the exchange rate. Hence, even if the (negative) correlation with the exchange rate variability is low and this factor explain only twenty per cent of total variance, it can be interpreted as a variable representing the *de facto* exchange rate regime: months with high values of this factor should represent regimes with a commitment to maintain the exchange rate stable, while months with low values of this factor should represent regimes with floating exchange rates.Table 1 shows the results of the principal components analysis.

Table 1 - Principal components analysis

	FACTOR 1	FACTOR 2	FACTOR 3
Fraction of variance explained by each factor	0.408	0.202	0.176
Factor loadings (normalised)			
Italian lira-French franc exchange rate and Italian lira-Deutsche Mark exchange rate	0.403	-0.191	0.080
Italian lira-pound sterling exchange rate	0.610	-0.194	-0.007
Italian lira-US dollar exchange rate	0.598	-0.191	-0.002
Foreign reserves	0.222	0.698	0.681
Difference between Italian discount rate and foreign discount rate	0.244	0.634	-0.728

3.2.2 Cluster analysis

In order to classify exchange rate regimes in Italy I use a cluster analysis methodology[18] that groups the months according to the principal component identified in the previous section.

I prefer using principal component analysis instead of applying directly cluster analysis to the original variables (as in Levy-Yeyati and Sturzenegger 2002a), owing to the more precise identification of the classification variable as an exchange rate regime variable.

Following Levy-Yeyati and Sturzenegger (2002a), I consider each cluster as representing a distinct exchange rate regime and classify the data into 5 clusters. Increasing the number of clusters does not improve the analysis.

The initial classification presents a large group of observations (1410 out of 1504) with an intermediate value of the regime variable that does not allow us to distinguish regimes among them. This is due to our choice of not excluding outliers from the data set. Hence I need to reclassify observations in this class, which, following Levy-Yeyati and Sturzenegger (2002a), I call the "inconclusive" category.

In the second round classification I still have an inconclusive category but this is reduced to 981 observations. I therefore run a third round cluster analysis on the "inconclusive" class.

Table 2 shows, for each step and for each cluster, the mean, the standard deviation and minimum and maximum values of the "regime variable" and the variables used in principal component analysis to construct it.

[18] Among the various techniques of cluster analysis, I employ the centroid method.

Table 2 - Cluster analysis

		principal component (exchange rate regime variable)				monthly volatility in reserves				monthly volatility in Italian lira-French franc exchange rate and Italian lira-Deutsche Mark exchange rate*				monthly volatility in Italian lira-pound sterling exchange rate				monthly volatility in Italian lira-US dollar exchange rate				monthly volatility in the difference between the Italian discount rate and the foreign discount rate			
	N	mean	std	min	max	mean	std	min	max	mean	std	min	max	mean	std	min	max	mean	std	min	max	mean	std	min	max
1st step																									
1	33	-2.22	0.64	-4.05	-1.50	2.24	2.44	0.00	11.29	10.03	10.56	0.00	50.56	11.53	8.33	0.04	44.73	13.06	10.51	0.35	49.49	0.14	0.53	0.00	3.00
2	1410	-0.10	0.54	-1.37	1.75	2.29	2.67	0.00	27.10	0.73	1.62	0.00	31.66	0.96	1.75	0.00	25.26	1.16	1.97	0.00	22.63	0.10	0.25	0.00	2.00
3	45	2.58	0.52	1.86	3.71	11.80	9.26	0.02	34.96	0.78	1.01	0.00	3.73	1.69	2.31	0.03	9.63	1.72	3.76	0.00	23.69	0.94	0.75	0.00	2.50
4	14	5.39	0.95	4.20	7.61	25.13	16.92	0.36	46.25	2.39	2.95	0.00	9.31	2.54	3.07	0.08	10.88	3.22	3.26	0.12	11.91	1.64	1.39	0.00	4.00
5	2	9.75	0.53	9.37	10.12	61.09	18.22	48.21	73.98	3.11	4.39	0.00	6.21	0.67	0.46	0.35	0.99	3.21	3.86	0.49	5.94	1.13	1.59	0.00	2.25
total	1504																								
2nd step																									
1	96	-0.95	0.17	-1.38	-0.71	1.09	1.58	0.00	12.16	2.88	2.44	0.00	11.71	3.76	3.10	0.05	25.26	4.08	3.06	0.03	13.75	0.02	0.09	0.00	0.50
2	981	-0.29	0.19	-0.70	0.16	1.58	1.55	0.00	18.93	0.51	1.36	0.00	31.66	0.68	1.17	0.00	15.40	0.88	1.54	0.00	22.33	0.01	0.08	0.00	1.00
3	189	0.41	0.14	0.17	0.65	4.47	3.24	0.04	27.10	0.62	1.26	0.00	11.06	0.85	2.18	0.00	24.43	1.09	2.31	0.00	22.63	0.20	0.27	0.00	1.50
4	64	0.83	0.11	0.67	1.03	5.23	3.65	0.15	13.10	1.07	2.32	0.00	14.73	0.97	1.41	0.00	6.28	1.12	1.51	0.00	6.03	0.41	0.30	0.00	1.00
5	80	1.31	0.16	1.06	1.75	4.79	5.10	0.05	19.46	0.83	1.46	0.00	10.94	1.27	1.67	0.00	9.02	1.38	1.68	0.00	9.09	0.75	0.41	0.00	2.00
total	1410																								
3rd step																									
1	146	-0.55	0.06	-0.70	-0.47	0.96	1.15	0.00	10.00	1.08	1.24	0.00	7.68	1.48	1.33	0.00	10.79	1.90	1.78	0.00	12.78	0.00	0.02	0.00	0.25
2	303	-0.39	0.03	-0.46	-0.34	0.62	0.80	0.00	7.23	0.39	0.88	0.00	11.46	0.44	0.64	0.00	6.31	0.59	0.90	0.00	6.64	0.00	0.03	0.00	0.50
3	332	-0.25	0.06	-0.33	-0.14	1.69	1.09	0.09	8.33	0.35	0.77	0.00	10.24	0.58	1.30	0.00	15.40	0.69	1.32	0.00	11.65	0.01	0.06	0.00	0.50
4	96	-0.07	0.04	-0.13	-0.01	2.93	1.03	0.72	6.94	0.34	0.46	0.00	2.00	0.72	1.15	0.00	4.58	0.83	1.24	0.00	6.38	0.02	0.09	0.00	0.50
5	104	0.08	0.05	-0.01	0.16	3.70	2.18	0.02	18.93	0.77	3.21	0.00	31.66	0.54	1.25	0.00	9.50	0.92	2.61	0.00	22.33	0.06	0.18	0.00	1.00
total	981																								

*Lira-franc to 1939, lira-mark from 1950 on.

The interpretation of clusters changes in each step.

In the *first* round classification "extreme values" (i.e., observations that present a very high degree of variability in some of the variables used for extracting the principal component) are classified. The clusters identified at this level are the following:

1) the class with the lowest mean value of the principal component (-2.22) is made up of months during which the exchange rate regime was a "freely" floating regime:[19] very high variability in the exchange rate is associated with low change in the discount rate compared with that of the other countries and relatively low changes in reserves, showing no commitment by the authorities to maintain the exchange rate fixed. In this category periods of continuous depreciation (for example from the spring of 1919 through the end of 1920) as well as single months of deep and sudden devaluation (for example October 1936) are included;
2) the second cluster represents the "inconclusive" category that I have mentioned before: it presents a mean value of the variables that makes it impossible to draw conclusions about the regime adopted in each month. This group will be analysed in the second step of cluster

[19] Following Reinhart and Rogoff (2002), I indicate, with this word, periods during which the exchange rate was totally out of the control of the authorities for a continuous period of time.

analysis;

3) the third cluster groups months with a certain degree of exchange rate variability and substantial changes in the discount rate and in international reserves: in these periods, in the presence of exchange rate instability, the authorities tried hard to stabilise the exchange rate, under floating or fixed exchange rate regimes, successfully (for example in September 1931 after the pound devaluation) or unsuccessfully (for example in September 1936 before lira devaluation). These months are dispersed in the long period under examination. I therefore attribute such episodes to the regime prevailing at the moment of intervention;
4) and 5) these clusters can be grouped together. They include months with high exchange rate instability, high variability of the discount rate and very high movements in international reserves: they are mostly months during which a currency crisis occurred (for example the crises of January 1976 and September 1992).

In the *second* round classification, months that in the first step are grouped in the "inconclusive" category are now reclassified:

1) the first group, which shows the lowest mean value of the principal component of this second round classification, comprises months with high variability in the exchange rate, small changes in the discount rate compared with the other countries and low volatility of reserves. The variability of exchange rates, however, is lower than that of group 1 of the first round classification, so I classify the observations in this group as floating exchange regime months;

2) this cluster represents again an "inconclusive" category;
3) this class mostly includes months when the authorities adopted a stringent fixed exchange rate regime: the mean value of the exchange rate changes is low compared with the high variability of reserves. This category includes months under true hard pegs but also periods that, because of the presence of capital controls or the lack of a legal commitment to a fixed exchange rate, were actually soft pegs;
4) and 5) these clusters can be grouped together given that they both present months during which the authorities tried to stabilise the exchange rate, under both floating and fixed exchange rate regimes. These months present the same characteristics as the observations of group 3 of the first round classification, but the degree of intervention was lower. They

are scattered throughout the period under examination. Accordingly, I again attribute such episodes to the regime prevailing at the moment of intervention.

In the *third* round classification, months that in the previous step have been grouped in the inconclusive category are now reclassified:

1) the first group of this classification represents again the group with the lowest value of the principal component. Changes in the reserves are lower than those seen in the first group of second round classification, but they are higher if compared to the exchange rate changes. Hence, I classify the observations in this group as managed floating exchange regime months;
2) this category includes all periods during which the lira slowly depreciates but the rate of depreciation seems to be under control as, broadly speaking, in crawling peg regimes (I observe such a pattern, for example, between the end of 1907 and the outbreak of the First World War);
3) I classify months in this class as soft peg regimes as they show sizeable changes in reserves compared with those observed in the exchange rates, which, however, exhibit a certain degree of variability.
4) and 5) these two classes include months with stable exchange rates and large reserve changes that identify more stringent fixed exchange rate regimes in the sense indicated at point 3 of the second round classification. These months can be grouped together with months of group 3 of the second round classification. They differ from those months only for the lower degree of variability of the relevant variables.

3.3 The final classification

On the basis of the analysis of the stylised facts, the results of the principal component and cluster analyses carried out in previous sections and information gathered from other

sources, I propose a classification of exchange rate regimes for Italy only in part similar to previous classifications[20] (see Table 3 below).

As explained above, when a clear commitment to a fixed rate did not exist or capital controls were in action, even though the classification based on principal component and cluster analyses gave indications of a strict fixed exchange rate, I have classified these periods under soft pegs. Moreover, since I am interested in identifying regimes and not single episodes of crisis, I have not reported the single exchange rate crises that occurred in Italy in the long period under examination. In addition, given the limited number of months classified under a freely floating regime, I have included these observations under the broader category of floating exchange rate regimes. Finally, for the sake of simplicity, I have labelled periods of slow and gradual depreciation (or appreciation) as "crawling peg" regimes, even though the definition of crawling peg regime is, in many respects, different (for example in a true crawling peg regime the rate of depreciation is publicly stated).

[20] See, for example, Ciocca and Ulizzi (1990).

Table 3 - Exchange rate regimes in Italy (1861-1998)

Period					Regime		Reference monetary system
					de facto	*de jure*	
January	1861	-	May	1866	hard peg	convertibility	bimetallic system
June	1866	-	March	1868	floating	inconvertibility	-
April	1868	-	October	1875	managed floating	inconvertibility	-
November	1875	-	September	1880	crawling peg	inconvertibility	-
October	1880	-	March	1883	soft peg	inconvertibility	-
April	1883	-	December	1886	hard peg	convertibility	bimetallic system
January	1887	-	August	1890	soft peg	convertibility	bimetallic system
September	1890	-	June	1893	crawling peg	convertibility	bimetallic system
July	1893	-	January	1894	floating	convertibility	bimetallic system
February	1894	-	May	1894	floating	inconvertibility	-
June	1894	-	September	1898	managed floating	inconvertibility	-
October	1898	-	November	1902	crawling peg	inconvertibility	-
December	1902	-	November	1907	soft peg	inconvertibility	-
December	1907	-	August	1914	crawling peg	inconvertibility	-
September	1914	-	March	1918	managed floating	inconvertibility	-
April	1918	-	September	1918	floating	inconvertibility	-
October	1918	-	March	1919	soft peg	inconvertibility	-
April	1919	-	July	1923	floating	inconvertibility	-
August	1923	-	August	1925	managed floating	inconvertibility	-
September	1925	-	April	1926	soft peg	inconvertibility	-
May	1926	-	July	1926	managed floating	inconvertibility	-
August	1926	-	November	1927	soft peg	inconvertibility	-
December	1927	-	September	1931	hard peg	convertibility	gold exchange standard
October	1931	-	November	1934	soft peg	convertibility	"tempered" gold standard
December	1934	-	March	1946	inconvertibility	inconvertibility	-
April	1946	-	August	1947	managed floating	inconvertibility	Bretton Woods
September	1947	-	December	1958	soft peg	inconvertibility	Bretton Woods
January	1959	-	August	1971	soft peg	peg to US dollar	Bretton Woods
September	1971	-	January	1973	soft peg	peg	Monetary Snake
February	1973	-	March	1976	managed floating	floating	-
April	1976	-	February	1979	crawling peg	floating	-
March	1979	-	January	1987	crawling peg	peg to DM (broad band)	European Monetary System
February	1987	-	January	1990	soft peg	peg to DM (broad band)	European Monetary System
February	1990	-	August	1992	soft peg	peg to DM (narrow band)	European Monetary System
September	1992	-	March	1993	floating	floating	-
April	1993	-	April	1996	managed floating	floating	-
May	1996	-	October	1996	soft peg	floating	-
November	1996	-	December	1998	soft peg	peg to DM	European Monetary System

3.4 A brief summary of the exchange rate regimes de facto adopted in Italy

The new Kingdom of Italy adopted a bimetallic system and maintained convertibility until the outbreak of the war against Austria, in 1866. From 1866 to 1868 the lira floated. In 1868 a managed floating regime was adopted, but with the final objective of the appreciation of the currency. From 1876, impression is that exchange rate policy allowed for a slow depreciation of the lira, with fluctuations contained in a limited range (showing something similar to a crawling peg regime).

A change occurred in the early 1880s. Expectations of restoration of convertibility generated large speculative capital movements towards Italy, made possible by the availability of foreign (British) capital (Fenoaltea 2003a and 2003b).

Convertibility, restored in 1883, was maintained for only four years, showing signs of weakness beginning in 1885.

After 1887 convertibility was *de facto* suspended. Yet according to our classification the exchange rate still constituted a major objective of the authorities up to 1890, although the target zone was gradually widened. It is only afterwards that the lira was left free to depreciate,[21] gradually at first, completely from the second half of 1893.

After the formal suspension of convertibility in 1894 and a period of a more or less managed float, from the end of 1898 favourable conditions were probably exploited by the authorities to allow the currency to appreciate slowly and reach the gold parity at the end of 1902.

From 1902 to 1907, when rapid economic growth was associated with a *de facto* adherence to the gold standard, Italy seems to exhibit what has recently been called "fear of pegging" (see Section 2.4), which thus appears to be a phenomenon dating back to the early twentieth century.

The slow depreciation of the period 1908-1914 shows that the "fear of pegging" was probably justified.

During the First World War the exchange rate was controlled to an extent but from the second half of 1919 through the first half of 1923 it seems to have been completely floating. From 1923 to 1925 signs of control appeared, but it was only from the second half of 1925, and more forcefully from the second half of 1926, that the government's determination to restore convertibility emerged.

The restoration of convertibility in 1927 lasted until the crisis of sterling in September 1931, when a change of regime took place. From then to 1934 the target zone was widened beyond the gold points, as underlined by De Cecco (1993) and Sorrentino (1999), and the

[21] This conclusion is consistent with the analysis by De Cecco (2003, p. 18).

lira was on a "tempered gold standard," as openly declared in the Bank of Italy's report in 1933 (cited in Cotula and Spaventa 1993 and Sorrentino 1999). From 1934 the lira became *de facto* inconvertible and in October 1936 was finally devalued.

After the Second World War and a short period of a *de facto*, although not openly declared, managed floating regime, from 1948 to 1971 the lira was pegged to the US dollar. However, convertibility was restored only at the end of the 1950s.

Following the breakdown of the Bretton Woods system and the failure of the subsequent Monetary Snake, the lira floated until 1976, when a *de facto* crawling peg regime was adopted in Italy.

The EMS period, starting in 1979, was, as observed by other authors (Reinhart and Rogoff 2002), a crawling peg regime at least up to 1987,[22] and thus did not constitute a radical change with respect to the immediately preceding years. Afterwards, a more stringent regime was adopted, especially from 1990, when Italy entered the narrow band of the EMS.

Adherence to the EMS within the narrow band lasted less than three years. Following the crisis of September 1992, the lira was allowed to float and, after another crisis in 1995, it was again pegged *de facto* and *de jure* to the Deutsche Mark from 1996 up to the advent of the European Monetary Union.

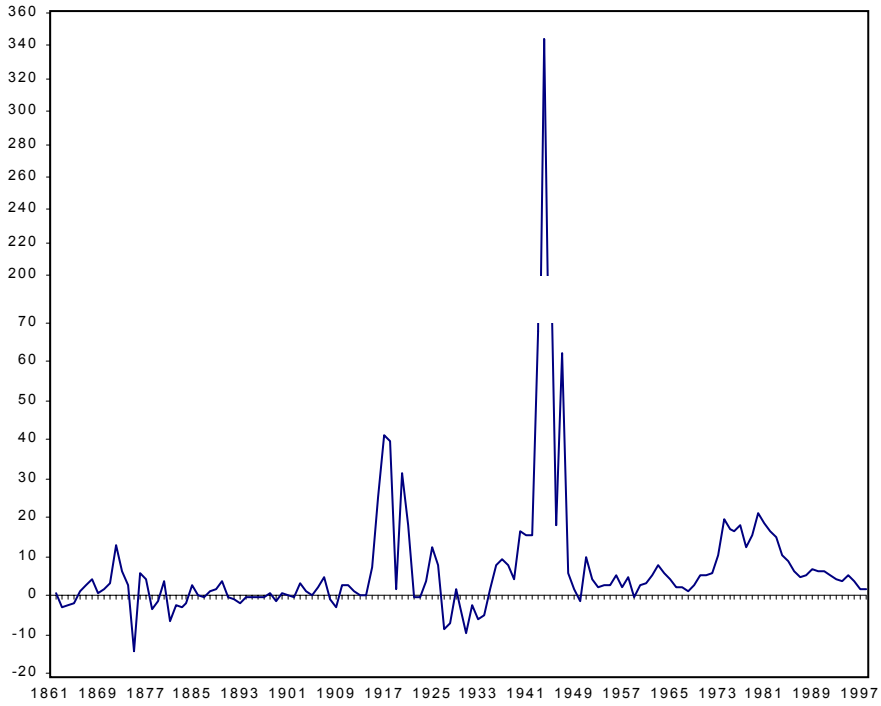
4. Exchange rate regimes and inflation performance in Italy

4.1 Inflation performance: a first look at the data

Figure 2 and Table 4 provide a first look at the data. Table 4 shows, in particular, the mean and the standard deviation of the inflation rate (measured as the rate of change in the cost-of-living index) in each regime identified in the *de facto* classification in Section 3.

[22] This is consistent with exchange rate regime classifications by other authors (see for example Onida 1995).

Figure 2 - Inflation rate*



(*) Annual percentage change in the consumer price index.

Inflation averaged 8.7 per cent per year over the whole period 1861-1998, with substantial differences across regimes: -2.9 per cent under hard pegs, 2.7 per cent during soft pegs, 5.4 per cent in periods when the exchange rate was allowed to slowly depreciate or appreciate, 6.7 per cent under fully floating regimes and 10.7 per cent under managed floats.

Hence a first simple inspection of the numbers confirms for Italy the conventional wisdom about exchange rate regimes and inflation performance: low inflation rates characterise periods during which some form of exchange rate peg is adopted, while high inflation rates are typical of more flexible exchange rate regimes. What differs from other analyses is the worse performance of managed floats compared with completely flexible regimes.

Table 4 - Inflation rate (% per year)

		π		π/(1+π)	
	Obs	Means	SD	Means	SD
Hard Peg	13	-2.9	3.6	-2.8	3.5
Soft Peg	48	2.7	3.3	2.4	3.1
Crawling Peg	28	5.4	7.4	4.4	6.0
Managed Floating	29	10.7	15.1	7.6	9.3
Floating	8	6.7	11.1	4.9	7.8

Observing the standard deviations we note the same pattern as for the means: they increase almost monotonically with the degree of flexibility of the exchange rate regime. It is worth noting that the worse inflation performance under flexible exchange rates (dirty and fully floating) may be due to a few hyperinflationary episodes. To address this potential bias, following Ghosh et al. (1997), I have calculated a scaled measure of inflation, $\pi/(1+\pi)$, in order to reduce the effect of outliers. Still, the relative performance of different regimes remains unchanged.

4.2 Inflation regressions

In order to understand the factors underlying the difference in inflation performance of the various regimes, following Ghosh et al. (1997) and Levy-Yeyati and Sturzenegger (2001), I consider a simple money demand equation to obtain an expression for inflation:

$$\pi = \Delta \log m - \alpha \Delta \log y + \beta \Delta \log i + \Delta \log v$$

where π represents the inflation rate, $\Delta \log m$ the rate of growth of broad money, $\Delta \log y$ the real output growth, $\Delta \log i$ the growth rates of nominal interest rate, and $\Delta \log v$ the growth rate of residual velocity. This model belongs to the class of models of inflation derived from the "quantity theory," in which the money-demand equation is solved for the

price level and nominal money is treated as exogenous. "Although there are technical and empirical drawbacks to this last approach (discussed in Hendry and Ericsson 1991; Ericsson and Irons 1994; Hendry 2000), it is obviously important to test the impact of excess money holdings on inflation" (Hendry 2001, p. 261). "The textbook description of inflation suggests two fundamental causes, excess monetary growth (faster than real output) and the dissipation of external shocks" (Greene 2000, p. 799). More complex models that consider many other variables, like those used by Hendry (2001) to model UK inflation, are not analysed here.

In the same way as Ghosh et al. (1997) I estimate two regressions. In the first, the inflation rate (π) is regressed on four exchange rate regime dummies: hard peg (*HP*), soft peg (S*P*), crawling peg (C*P*) and managed floating (MF) regime, with the floating regime representing the excluded category. The other explanatory variables are real output growth (Δ *GDP*) and openness (ratio of exports plus imports to GDP) (*OPEN*). Openness is usually included to control for the potential disciplinary effect induced by the cost of monetary expansion in open economies and by international arbitrage. Following Levy-Yeyati and Sturzenegger (2001), I also include lagged inflation as additional explanatory variable, in order to take into account the effect of past policies on current expectations and to control for possible backward-looking indexation. Finally, I include a dummy (*WAR*) that takes the value of one in war years and zero elsewhere. I do not yet include in the regression the growth rates of broad money (Δ*M2*) and interest rates (Δ*INTRATE*).

Table 5 reports unit root tests on the variables entering the regressions.[23] Inflation in Italy proves stationary over the whole period 1861-1998 (the same result holds for the non-scaled measure of inflation). It is worth noting, however, that, as noted by some authors (among others: Muscatelli and Fratianni 1996; Gallo and Otranto 1997), the order of integration of the inflation series has changed over time, appearing for long periods of time non-stationary, in particular I(1). The other variables entering the regressions are all stationary during the period analysed except openness, for which the assumption that the series is I(1) is rejected. Accordingly, in the following regressions I consider the growth rate of this variable.

[23] Throughout the rest of the paper I will refer to the scaled measure of inflation $\pi/(1+\pi)$ introduced in the previous paragraph.

Table 5 - Unit root tests[a]

	Unit Root	
	Augmented Dickey-Fuller	Phillips-Perron
π	-3.94***	-4.93***
Δ GDP	-5.18***	-9.09***
Δ M2	-3.24**	-3.47**
Δ INTRATE	-4.68***	-7.89***
OPEN	-0.64	-0.69

[a] One, two and three asterisks indicate significance at the 10, 5 and 1 per cent levels respectively.

The results of the first regression (Table 6, column 1) show that the coefficient of the hard peg dummy is highly significant: hard pegs are associated with 2.9 percentage points lower inflation than floating regimes. The coefficients of the other regime dummies are not significantly different from zero. Moreover, greater openness has a significant positive impact on inflation (contrary to what has been shown for other countries). Output growth has the expected sign but is not significant. Wars increase inflation and the effect of past inflation is substantial.

To take into account the separate effect of the credibility and discipline effects of the exchange rate on the rate of inflation, I estimate another regression that now includes the growth rates of broad money (*ΔM2*) and interest rates (*ΔINTRATE*) among the explanatory variables. The results (Table 6, column 2) are only in part consistent with those obtained by Ghosh et al. (1997): *ceteris paribus,* monetary growth has a significant positive impact on inflation while the interest rate, output growth and openness coefficients are not significant.

Table 6 - Inflation regressions[a]

	(1)	(2)
C	0.015	0.003
	0.011	*0.014*
HP	-0.029 **	-0.027 *
	0.014	*0.015*
SP	-0.004	-0.007
	0.011	*0.015*
CP	0.0004	0.006
	0.013	*0.014*
MF	-0.006	0.003
	0.012	*0.013*
ΔGDP	-0.129	-0.233
	0.126	*0.168*
π(-1)	0.670 ***	0.425 ***
	0.068	*0.114*
ΔOPEN	0.102 **	0.045
	0.042	*0.045*
WAR	0.103 ***	0.050 **
	0.015	*0.024*
ΔM2		0.293 **
		0.117
ΔINTRATE		0.033
		0.054
Observation	133	133
R^2	0.68	0.73

[a] Numbers in italics are Newey-West heteroskedasticity and autocorrelation consistent standard errors (Newey-West 1987) (significant heteroskedasticity and autocorrelation of residuals have been detected in preliminary analyses). One, two and three asterisks indicate significance at the 10, 5 and 1 per cent levels respectively. Given that the models contain both autocorrelation and lagged dependent variable, I used an Eviews routine that estimates AR models using nonlinear regression techniques. The nonlinear least squares estimates are asymptotically equivalent to maximum likelihood estimates and are asymptotically efficient.

The war dummy is slightly less significant and with less magnitude, given that in the previous regression it incorporated the effect of large money creation during war time. The coefficient of hard pegs falls only a little and remains significant, while those of the other regime dummies are again not significant. Thus, even taking into account the disciplinary effect of pegged exchange rates (proxied by monetary growth) a credibility effect of exchange rate regimes (hard pegs) on inflation seems to remain. Finally, the effect of past

inflation is reduced but nonetheless still shows considerable inertia, contrary to what has been found for other countries (see, for example, Hendry 2001, for UK inflation).

Figures 3a and 3b below show the fitted and actual values, the scaled residuals, CUSUM stability test and the one-step forecast test that plots, together with the recursive residuals (right vertical axis), the probability values for those sample points where the hypothesis of parameter constancy would be rejected at the 5, 10 or 15 per cent levels (left vertical axis).

Figure 3a - Inflation model fit and residuals

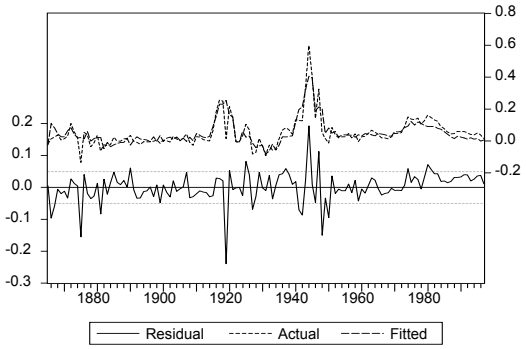


Figure 3b - Inflation model one-step residuals and CUSUM test

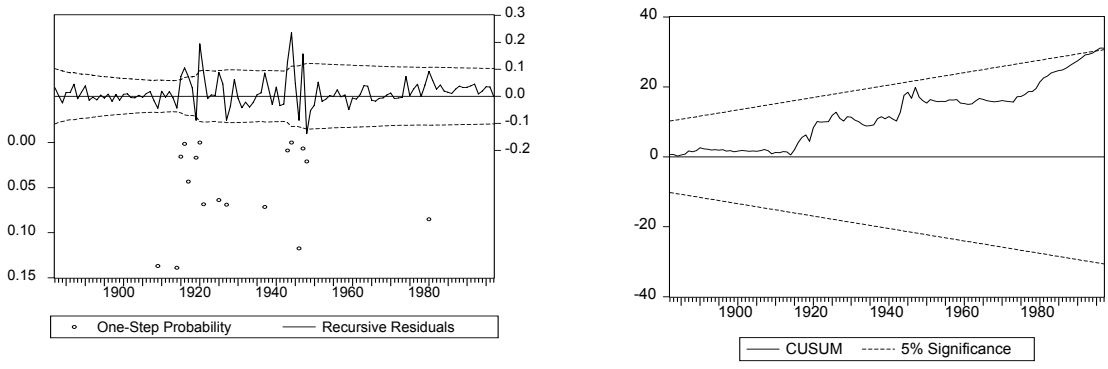
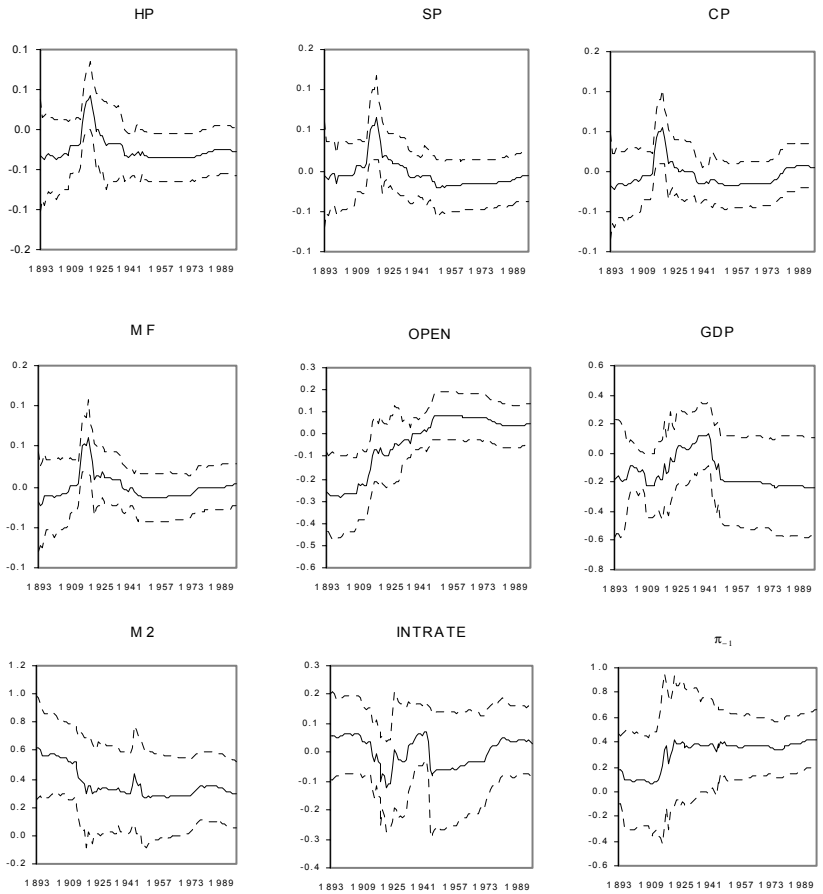


Figure 4 plots the recursive coefficient estimates. Figures 3a, 3b and 4 show signs of instability of parameters. In particular, the coefficient of past inflation (Figure 4) presents an upward shift after the First World War, while M2 seems to have a more pronounced effect on inflation before the First World War, even though this effect is considerable and

significant throughout the period. However, the exchange rate regimes coefficients appear to be fairly stable (except for unmodelled changes around the First World War) in this period.

Figure 4 - Inflation model recursive coefficients with ±2SE



4.2.1 Causality

On the basis of the foregoing analysis we may infer that, in Italy, adherence to a hard peg has induced lower average inflation. Yet this apparent causal relationship may be due to reverse causation, i.e. in periods of price stability it is possible for governments to maintain a pegged exchange regime. In other words, the conclusion that fixed exchange rate regimes are associated with lower inflation may be subject to potential endogeneity problems.

In order to address this issue I run a 2-stage instrumental variable estimation with a serial correlation of order one. Following Levy-Yeyati and Sturzenegger (2001), I first construct a regime index representing the various regimes identified in Italy. I then estimate a multinomial logit regression of the regime index on all the variables included in the inflation regression, plus, as an additional control, the ratio of Italy's GDP to the UK's, as a measure of the relative size of the Italian economy.[24] Finally I use the estimated regimes from the multinomial logit as instruments for the regime dummies in the original specification of inflation. The results (Table 6a) show that the hard peg coefficient is no longer significant and that, in effect, in Italy greater price stability has generally led to the adoption of a fixed exchange rate rather than being its consequence. We also see that the only significant coefficients are the coefficients of past inflation and M2.

[24] Smaller countries tend to be more open and should prefer fixed exchange rate regimes. I have chosen the UK as the reference country given the long period analysed.

Table 6a – Inflation regression: accounting for endogeneity[a]

C	-0.028
	0.029
HP	-0.001
	0.091
SP	-0.011
	0.042
CP	0.040
	0.087
MF	-0.035
	0.054
ΔGDP	-0.105
	0.187
π(-1)	0.270 ***
	0.101
ΔOPEN	0.066
	0.088
WAR	0.068
	0.053
ΔM2	0.421 ***
	0.118
ΔINTRATE	0.023
	0.053
Observation	133
R^2	0.64

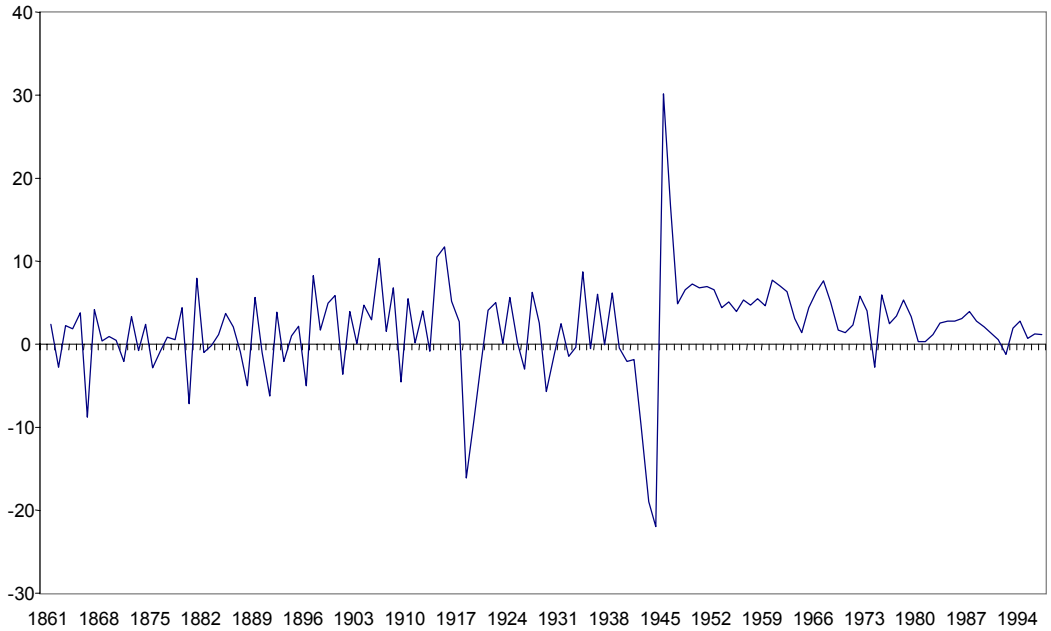
[a] Numbers in italics are Newey-West heteroskedasticity and autocorrelation consistent standard errors (Newey-West 1987). One, two and three asterisks indicate significance at the 10, 5 and 1 per cent levels respectively. Given that the models contain both autocorrelation and lagged dependent variable, I again used an Eviews routine that estimates AR models using nonlinear regression techniques.

5. Exchange rate regimes and output growth in Italy

5.1 Growth performance: a first look at the data

The evolution of real per capita GDP is shown in Figure 5 and Table 7. Table 7 reports the mean and the standard deviation of the growth rate of real per capita GDP in each regime identified in Section 3.

Figure 5 - Real per capita GDP (annual percentage changes)



Over the whole period 1861-1998 real per capita growth averaged 2 per cent per year. Again, however, we observe substantial differences across regimes.

Table 7 provides a first rough idea of growth performance under the different exchange rate regimes adopted in Italy since unification. These first results, obtained using the new classification of exchange rate regimes in Italy, contrast in part with the theoretical argument according to which more flexible exchange rate regimes should produce higher rates of growth (see Section 2).

Table 7 - Real per capita GDP growth rate (% per year)

	Obs	Means	SD
Hard Peg	13	0.5	3.1
Soft Peg	48	3.5	3.3
Crawling Peg	28	1.5	3.2
Managed Floating	29	3.9	6.7
Floating	8	-3.2	7.1

In fact, while under hard peg regimes the growth rate of per capita real GDP is close to zero (0.5), under soft pegs the average growth rate is quite high (3.5) and akin to the maximum rate of the managed floating regimes (3.9). The negative rate observed under fully flexible regimes shows that, in the case of Italy, completely flexible regimes have been disruptive, at least according to these preliminary results. Yet it is worth noting that completely flexible exchange rates have been adopted in Italy only in critical situations (for example, exchange rate crises).

5.2 Growth regressions

I will use a simple model for growth. My objective is not to explain Italian economic growth, which would be a very arduous task, but only to roughly test if the exchange rate may have had a role in Italian development. I will use variables often found in the empirical

growth literature (Levine and Renelt 1992; Barro and Sala-i-Martin 2003) that are available in the period analysed though not exhaustive.

In particular, following Levy-Yeyati and Sturzenegger (2002b), I regress real per capita growth ($\Delta \log y$) on the regime dummies,[25] the rate of change in the terms of trade (ΔTT), the lagged growth in government consumption (ΔGOV), the investment to GDP ratio (I/Y), openness[26] ($OPEN$) and population growth ($POPGR$). I have also included a dummy for war years. Other variables frequently found in the empirical growth literature are not available for the long period examined. The variables entering the regressions are almost all stationary during the period (see Table 8 below). Only for the investment-to-GDP ratio is the assumption that the series is I(1) rejected.

Table 8 - Unit root tests[a]

	Unit Root	
	Augmented Dickey-Fuller	Phillips-Perron
$\Delta \log y$	-5.12***	-9.22***
I/Y	-1.54	-1.59
ΔTT	-5.54***	-12.06***
ΔGOV	-5.56***	-8.06***
$POPGR$	-2.77*	-3.73***

[a] One, two and three asterisks indicate significance at the 10, 5 and 1 per cent levels respectively

Given that the investment-to-GDP ratio and openness are nonstationary, I take first differences of these variables in the following regressions.

The results are shown in Table 9 below. The coefficients of the regime dummies are substantially consistent with the findings of Section 5.1: growth rates are significantly higher

[25] Again, as for inflation regressions, I will consider a dummy for each regime, where the excluded category is the floating exchange rate regime: hard peg (HP), soft peg (SP), crawling peg (CP), managed floating (MF).

[26] Ghosh et al. (1997) use instead the growth rate of foreign trade.

for soft pegs and managed floating regimes. Real per capita growth is positively and significantly correlated with investment and government consumption. It is negatively and significantly correlated with openness even if the effect seems to be minor. The coefficients of the rate of change in the terms of trade and the war dummy are not significant.

Table 9 - Growth regression[a]

C	-0.044 *
	0.024
HP	0.012
	0.022
SP	0.053 **
	0.021
CP	0.040 *
	0.022
MF	0.065 ***
	0.023
ΔINVGDP	0.015 **
	0.006
ΔTT	-0.118
	0.076
ΔOPEN	-0.004 **
	0.002
WAR	-0.019
	0.033
ΔGOV(-1)	0.123 **
	0.051
POPGR	0.033 **
	0.015
Observation	133
R^2	0.38

[a] The numbers in parentheses are t-statistics based on White heteroskedasticity consistent standard errors. Significant autocorrelation of residuals has not been detected in preliminary analyses for the growth model. One, two and three asterisks indicate significance at the 10, 5 and 1 per cent levels respectively.

Figure 6a records the fitted and actual values and residuals. The Jarque-Bera test of normality of residuals is not significant at the 5 per cent level. Figure 6b reports one-step residuals with ±2 standard errors and CUSUM stability tests. The CUSUM test shows no structural break in the relationship. However, looking at the one-step residuals, the relationship seems better suited to the post-Second World War period even if clear signs of instability are detected only during the Second World War.

Figure 7 plots the recursive coefficient estimates. The analysis of the recursive coefficients shows some problems in the relationship: some coefficients are almost constant, others present some upward drift and unmodelled changes around the First and the Second World Wars. In particular, investment seems to be more important for growth after the Second World War, as pointed out by many economic historians (Cohen and Federico 2001), while the coefficient of government consumption shows distinct shifts in the coefficient in war years. Nonetheless, the relationship, while deserving more inspection for each subperiod, can represent a first raw tool for evaluating the influence on growth of the exchange rate regimes, whose coefficients are reasonably stable throughout the period analysed.

Figure 6a - Growth model fit and residuals

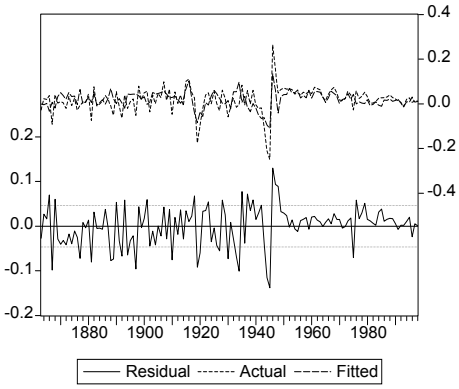


Figure 6b – Growth model one-step residuals and CUSUM test

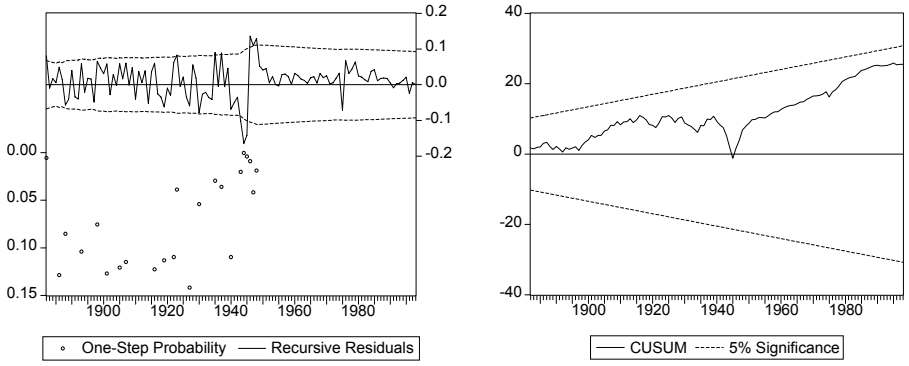
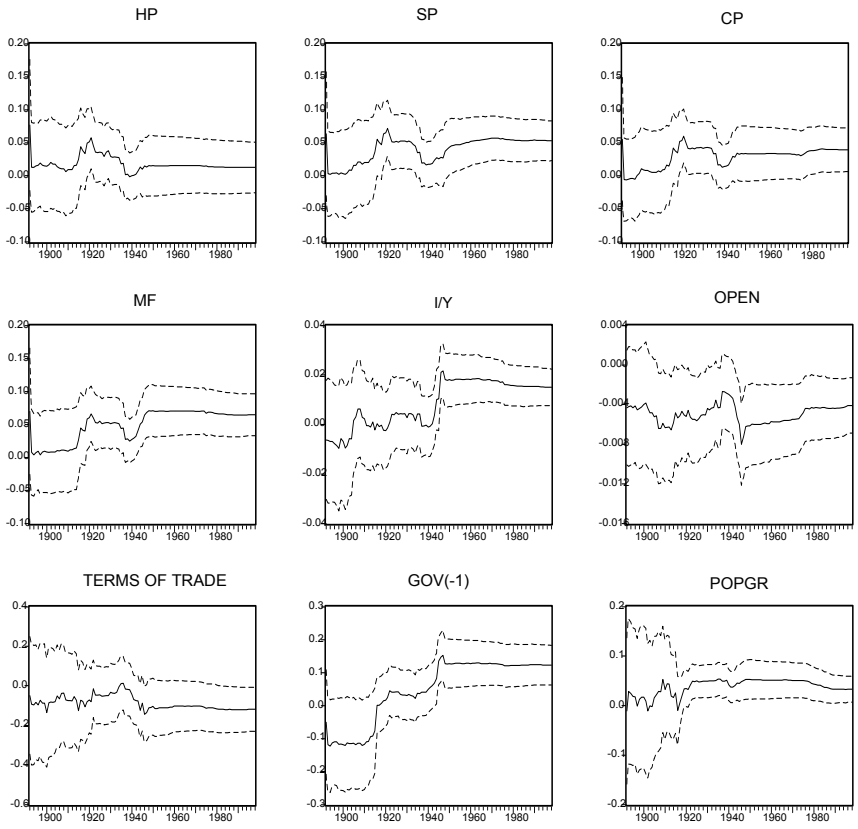


Figure 7 - Growth model recursive coefficients with ±2SE



5.2.1 Causality

The apparent causal relationship from exchange rate regimes to growth may actually again be due to reverse causation, i.e. in periods of high growth rates governments are able to maintain a pegged exchange regime and they are interested in doing so for many reasons: for example, the need for debt financing abroad (as in the early years of the last century) or participation in an international agreement (as under Bretton Wood system), together with the need to develop trade since exchange-rate uncertainty tends to reduce international trade and discourage investment (see Section 2.3). Moreover, the empirical literature on financial

crises has emphasised the link between poor growth and the occurrences of speculative attacks and currency and banking crises that may generate a negative relationship between growth and exchange rate variability.[27] Hence even the relationship between exchange rate regimes and growth may be subject to potential endogeneity problems. I correct for endogeneity following the same procedure as in Section 4.2.1. I run a 2-stage instrumental variable estimation with heteroskedasticity consistent standard errors.[28] After constructing a regime index representing the various regimes identified in Italy, I estimate a multinomial logit regression of the regime index on all the variables included in the inflation regression, plus, as an additional control, the ratio of Italy's GDP to the UK's,[29] as a measure of the relative size of the Italian economy. Finally, I use the estimated regimes from the multinomial logit as instruments for the regime dummies in the original specification for growth. Results are presented in Table 9a below and show in effect no influence of exchange rate regimes on growth. The investment-to-GDP ratio coefficient appears to be the only coefficient significantly different from zero. Hence the results of the preceding section seem to be spurious. However, the choice of an exchange rate not subject to high variability may have helped to maintain the conditions for sustainable growth.

[27] See Kaminsky and Reinhart (1999) and Frankel and Rose (1996), among others.

[28] Significant autocorrelation of residuals has not been detected in preliminary analyses for the growth model.

[29] As already noted, I have chosen the UK as the reference country given the long period analysed.

Table 9a - Growth regression: accounting for endogeneity[a]

C	-0.037
	0.288
HP	-0.096
	0.782
SP	0.055
	0.387
CP	0.082
	0.288
MF	-0.012
	0.812
ΔINVGDP	0.014 *
	0.008
ΔTT	-0.191
	0.740
ΔOPEN	-0.003
	0.014
WAR	-0.004
	0.051
ΔGOV(-1)	0.124
	0.154
POPGR	0.047
	0.067
Observation	133
R^2	0.12

[a] The numbers in parentheses are t-statistics based on White heteroskedasticity consistent standard errors. Significant autocorrelation of residuals has not been detected in preliminary analyses for the growth model. One, two and three asterisks indicate significance at the 10, 5 and 1 per cent levels respectively.

6. Conclusions

The main conclusions that can be drawn are the following:

- Italy adhered to the gold standard only for short periods (on a *de jure* or *de facto* basis). In line with the previous findings of the relevant literature, inflation performance is apparently better under the gold standard than in other regimes.

- In Italy, intermediate regimes like soft pegs or managed floats are associated with higher growth rates. In particular, Italy seems to have performed best, in terms of high output growth rate, under "soft peg" regimes, for example when the exchange rate was *de facto* pegged but the authorities were not legally committed to a fixed exchange rate or when rates were fixed but capital controls and adjustable pegs gave the authorities the chance to pursue independent macroeconomic policies.

- The case of Italy shows that for a fragile country the "hollowing out" hypothesis may not be true. This is because "fixing for your life" (to quote from Calvo and Reinhart 2000), or, I would say, floating for your life, is not possible, especially in particular economic conditions.

- A deeper investigation reveals, however, that this association between regimes and performance may actually reflect reverse causation, that is, a relationship that runs from the macroeconomic conditions of the country to the choice of an appropriate exchange rate regime rather than in the opposite direction. This does not rule out that exchange rate policy may have played an important role in maintaining conditions of sustainability of economic growth.

My last suggestion is that we should be careful in drawing conclusions on the causal link between exchange rate regime and economic performance for other countries as well. Considering the same period for any country may be incorrect. As we have seen for Italy in this paper, and has been pointed out in other studies, the exchange rate arrangements officially declared often do not represent a country's actual practice. A classification of regimes based on the observed behaviour of the exchange rate and other variables may lead to a better understanding of the link between exchange rate regimes and economic performance.

Appendix. The Data

The data set covers the period 1861-1998 and was derived from various sources.

Monthly data, used for classifying exchange rate regimes (see section 4), include:

1) Nominal Italian lira-French franc exchange rate, nominal Italian lira-US dollar exchange rate, nominal Italian lira-pound sterling exchange rate, nominal Italian lira-Deutsche Mark exchange rate. From 1861 to 1917, the source is a study by the Research Department of the Bank of Italy dated December 1941, drawn from the historical archive of the Bank:[30] ASBI, Banca d'Italia, Studi, pratt, n. 390, fasc. 1. Some data for this period have been also drawn from Camera dei Deputati, *Relazione intorno all'andamento degli istituti di emissione*, various years.[31] From 1918 to 1998, the source is: Ufficio Italiano dei Cambi (1991), and successive updates from the Ufficio Italiano dei Cambi website.[32] For the early years following the Second World War, data from Asso, Biagioli and Picozza (1998) have also been used.
2) Official metallic and foreign reserves. From 1861 to 1936, the source is: De Mattia (1967).[33] For the period after the Second World War various sources have been employed: Asso, Biagioli and Picozza (1998), International Monetary Fund, Banca d'Italia (1993), and, for more recent periods, Banca d'Italia, *Annual Report*, various years.
3) Official discount rates of Italy, France, the UK, and the USA. Sources: central banks' annual reports, various years.

Annual data, used for running inflation and growth regressions (see Sections 5 and 6), include:

1) Consumer price index. Source is ISTAT, *Sommario di Statistiche Storiche*, various years, and Istat, *Annuario Statistico Italiano*, various years.

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[30] This study makes use of various sources, among which are: *The Economist*, *Annuario Statistico Italiano*, *Annuario* of the Ministry of Finance, and the Rome stock exchange. For more details, see the above-mentioned study (also available from the author upon request).

[31] I thank Elio Cerrito for suggesting this source to me and for providing me with some of the data on the lira/franc exchange rate.

[32] www.uic.it

[33] The components considered here are the same used by Fratianni and Spinelli (1997; 2001).

2) Real per capita GDP. Source: Maddison (1995; 2001; 2003).
3) Broad money (M2). Source: from 1861 to 1889, De Mattia (1990); from 1890 to 1936, Cotula and Garofalo (1996); from 1937 to 1968, Garofalo and Colonna (1998). From 1969 to 1998 data have been drawn from Bank of Italy official publications (*Bollettino Mensile del Servizio Studi, Annual Report*).
4) Long-term interest rate. The long term interested rates used here are government bond yields. From 1861 to the Second World War the source is Bianchi (1979); for the subsequent period, Bank of Italy official publications (*Bollettino Mensile del Servizio Studi*, *Annual Report*).
5) Investments-to-GDP ratio. Sources: ISTAT, *Sommario di Statistiche Storiche*, various years; ISTAT, *Annuario Statistico Italiano*, various years; Rossi, Sorgato and Toniolo (1993); Golinelli and Monterastelli (1990) and subsequent updates.
6) Terms of trade. Source: ISTAT (1963) and ISTAT, *Statistica del Commercio Estero*, various years.
7) Import, Export, Public Consumption and Population, are all drawn from ISTAT, *Sommario di Statistiche Storiche*, and ISTAT, *Annuario Statistico Italiano*.

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