Fascist price and wage policies and Italy's industrial Great Depression

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Abstract

Both the industrial production index and the industrial employment index were below trend until at least 1936 in Italy after the 1929 crisis. Few studies have been conducted on the causes of Italy's slow recovery and, anyhow, have only led to partial explanations. Using monthly data, and reviving an aggregate supply model first published in Bernanke and Carey (1996), we empirically test if this behavior of the Italian industry could be related to the Fascist government's wage and price policies which, aiming at keeping nominal wages deflated by consumer prices constant, via mandatory wage cuts, actually raised firms' labour costs, computed as nominal wages deflated by wholesale prices, hence stalling industrial production. We find evidence of a strong countercyclicality of real wages and of nominal wage stickiness in Italy's industrial sector in the period 1929–36, which would confirm our hypothesis. We also show how trade restrictions played a smaller role in hindering industrial production than previously stated in literature, and confirm the weak transmission of financial turbulence to the real economy found in previous studies.

Keywords: Great Depression, Wage determination, Cartelization, Structural Breaks, GLM Newey estimator

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1 Introduction

The 1930s Great Depression was a global recession which affected many countries, albeit with different intensity and duration.[1] It is now widely recognized that the domestic crises were not simply a consequence of the propagation of the U.S. slump to the rest of the world economy, but were mainly due to country-specific, economic and structural factors. These factors were therefore responsible for the different degree of severity and persistence of each country's recession, two issues that strongly attract the attention of current researchers. Italy too was not spared a severe, and long, contraction.

The Great Depression has been explained by different authors as the consequence of frictions in the labor markets. The recession could, in fact, be explained by a slow and partial adjustment of nominal wages to the implemented monetary contraction and to the related price fall.[2] This nominal wage stickiness increased the real wages and depressed the demand for labor in the U.S. (Bordo, Erceg and Evans 2000). However, Cole, Ohanian and Leung (2005) criticized this Keynesian partial adjustment hypothesis, stressing, on the contrary, the importance of a negative technological shock. Assuming imperfect information and thus money non-neutrality, they show that the primary cause of the aggregate output, consumption and investment losses from 1929 to 1933 was the exogenous decline in total factor productivity. Moreover, they assert that the decline in the M1 demand was responsible for only one third of the fall in output growth.

This paper is concerned mainly with the second key issue of the Depression: its persistence. In particular, our analysis focuses on Italy's weak recovery in the industrial sector after 1932. Our proposal is, in fact, to test empirically the relationship between the Fascist management of the crisis in the labour and goods markets, and industrial performance in Italy during the 1930s. In doing so, we take a step into the direction of the "cartelization theory" (Chari, Kehoe and McGrattan 2002) or "microeconomic argument" (Eggertsson 2008) supported by Cole and Ohanian (2004), who, when investigating the U.S. Great Depression, ascertain that President Roosevelt's misguided policies accounted for the country's sluggish recovery. In particular, Cole and Ohanian examine the role that was played by the National Industrial Recovery Act (NIRA) of 1933, later replaced in 1935 by the National Labor Relations Act (NLRA). These measures favored the proliferation of cartels and of collusion in the industrial sector, raising prices, and at the same time urged entrepreneurs to offer higher nominal wages to their workforce, thus increasing the latter's bargaining power.[3] These two

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[1]Classic references, which underline the international dimension of the contraction, are Kindleberger (1973), Temin (1989) and James (2001).

[2]See Chatterjee and Corbae (2006) for a review.

[3]Hawley (1966) offers a complete and thorough description of the New Deal and of the

combined policies resulted in an increase in real wages, which significantly slowed the economy down. Cole and Ohanian's findings suggest that government intervention in the 1930s was a negative and restrictive measure, rather than a positive and stimulating one for the U.S. economy.[4]

As well as Cole and Ohanian, other authors too have analyzed the effect of the interplay of institutional change and market regulation on macroeconomic performance. Ebell and Ritschl (2008) explain the great macroeconomic volatility during the 1930s with shifts in the wage bargaining regime and in the degree of monopoly power in the economy. Moreover, Beaudry and Portier (2002), Fisher and Hornstein (2002) and Perri and Quadrini (2002) apply Cole and Ohanian's framework to France, Germany and Italy, respectively, in the 1930s. In particular, Perri and Quadrini (2002) examine the (negative) effects of trade restrictions and real wage rigidity on Italy's GDP in those years.

The aim of this paper is to contribute further to the stream of literature concerning Italy, in order to better understand the main determinants of its sluggish recovery and to enlarge the set of possible cross-country comparisons. Our methodological approach is different to that of the previous authors, as we prefer to focus only on one sector of the economy - industry - and choose to run regressions on high-frequency, rather than yearly, data. We thereby attempt to gauge the effect of the Fascist industrial policy measures - in the good markets, where cartels flourished under newly introduced legislation, and where consumer prices were boosted more than wholesale prices, and in the labor market, where mandatory nominal wage cuts were achieved in order to maintain a constant real-wage target - in a general context of closure to trade and international exchanges, on Italy's industrial performance in those years. The results point to a harmful combination of wage and price policies, but interestingly downsize the negative role of barriers to trade, emphasized by the existing literature on the subject.

The paper is organized as follows. Section 2 presents some macroeco-

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U.S. cartelization process in the 1930s.

[4]Chari, Kehoe and McGrattan (2002) attempted to reconcile the previously cited wage-stickiness theory of Bordo, Erceg and Evans (2000) with Cole and Ohanian's cartelization theory. Both type of frictions are, in fact, considered responsible for creating a discrepancy between the marginal rate of substitution between leisure and consumption and the marginal product of labor. Their findings concerning the U.S. downturn point to the fact that much of the slow recovery from 1933 to 1939 was due to this labor wedge. Eggertsson (2008), on the contrary, asserts that the New Deal was expansionary. By using a dynamic general equilibrium model, in fact, he highlights the importance of inflation expectations: the New Deal policies, including the NIRA, turned the previous highly deflationary expectations into inflationary ones. A higher expected inflation, *ceteris paribus*, reduces the real interest rate, thereby making lending cheaper and stimulating demand. His analysis introduces nominal frictions, whereas Cole and Ohanian's study assumes perfectly flexible prices. However, only under the former assumption, does Eggertsson's model hold: in fact, if prices are assumed to be flexible, the New Deal again results contractionary, confirming Cole and Ohanian's original findings.

nomic data concerning Italy's industrial sector in the 1930s, which confirm the severity and persistence of its Depression. The main explanations of Italy's negative performance given by the existing literature are in turn reviewed. Section 3 summarizes the Fascist regime's cartelization, price, union and labor policies. In particular, it focuses on the main legislation enacted in the 1930s, which primarily encouraged collusion, abolished workers' bargaining power and imposed a sequence of wage cuts as a consequence of the strong deflation present in the early 1930s. Section 4 attempts to explain the determinants of Italy's industrial production in 1929–36. The series is characterized by a structural break in November 1932. Evidence of real wage countercyclicality and of nominal wage stickiness is found . The effect of trade restrictions on industrial production, via a reduction in imports, is revealed to be less harmful than what the previous literature points to. Financial turbulence is confirmed to be scarcely relevant. Conclusions are presented in Section 5.

2 Italy's Great Depression: A Review of the Literature

Traditional Italian historical sources underline how Italy fared better than many European countries during the Great Depression.[5] If one plots the available raw GDP data, no significant fluctuation in fact appears. However, if the series is detrended, an approximately 10 per cent drop may be registered between 1929 and 1933, as shown in Figure 1.[6] Compared to the nearly 40 per cent drop in the U.S. (Cole and Ohanian 1999), Italy's downturn, however, still appears to be relatively contained.

The underestimation of Italy's slump may be due to different reasons. First, the seeds of Italy's Great Depression were already sown in 1927, when the country returned to the gold standard at an over-valued rate. Deflation and unemployment ensued; the 1929 international crisis thus worsened an already compromised scenario (Filosa, Rey and Sitzia 1976, pp. 58–59; Piva and Toniolo 1988, p. 229; Ripa di Meana 1993). Secondly, measurement issues unfold: the available Italian GDP estimates are widely recognized as being unreliable and unable to capture the true extent of Italy's interwar crisis.[7]

Industrial production data, for which alternative sources exist, tell us

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[5]See, for example, Gualerni (1976).

[6]The series has been detrended by dividing GDP by its long-run trend growth rate relative to a reference date. In particular, as in Perri and Quadrini (2002), we assume a long-run growth trend of an annual 2% growth and that the Italian economy was on trend in 1929. All data sources are discussed in the Appendix to which we refer.

[7]While this paper was being written, research was under way at Banca d'Italia to build new estimates of Italy's historical national accounts, with a specific focus on the 1920s and 1930s period. See Baffigi (2011) for a first overview of this reconstruction.

another story.[8] In Figure 1 we also plot the detrended series of Italy's industrial production index (from here on IPI). The IPI plummeted after 1929 by around 33 per cent until 1932, and only in 1939 did it return back on trend. The decline in Italy's industrial output was therefore strong and lasted for about four years (1929-1932). The recovery to get back on trend took another seven.[9]

Although the late-comer Italy was still an agricultural country at the turn of the XXth century, by 1929 all three sectors of the economy contributed roughly for the same amount to the creation of total value added (30 per cent circa, each).[10] In employment terms, in the same year, 50 per cent of labour was still engaged in agriculture, which however was shrinking, whereas 30 and 20 per cent respectively were employed in industry and services, both on the rise (Broadberry, Giordano and Zollino 2011). Hence a focus on industry alone sheds at least some light on Italy's overall performance.

Another interesting indicator to be analyzed is the industrial employment index, the third series plotted in Figure 1.[11] Employment in Italy fell until around 1933, after which it started rising steadily, returning on trend in 1936. It shows a similar pattern to that of the IPI.[12] Overall, Figure 1 points to a severe and protracted recession, at least in Italy's industrial sector.

Insert Figure 1 about here.

How does the existing - surprisingly scanty - quantitative literature on the topic explain Italy's downturn, and its subsequent slow recovery?

If one adopted the previously mentioned Cole, Ohanian and Leung (2005) view, one could expect to find evidence of a large-scale and persistent negative shock in the 1930s such as a technological shock. Consistent with the neoclassical growth literature, the occurrence of the latter reduces the efficiency with which firms transform their production factors, such as capital and labour, into output.[13] However, estimates by Rossi and Toniolo

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[8]Interestingly, the data sources used in this paper for industrial production are now being adopted in order to revise Italy's historical national accounts, as mentioned in the previous footnote.

[9]Cole and Ohanian (1999) noticed a similar pattern for the United States, when referring to the two series of the real GDP per adult and of the number of private hours worked, which led them to call "Great Depression" the entire decade 1929-1939.

[10]Computations conducted on Rossi, Sorgato and Toniolo (1993) data.

[11]The industrial employment index series has not been detrended, as in Cole and Ohanian (1999), since theory assumes it is constant along the steady state growth path.

[12]Mattesini and Quintieri (1997) explain how the industrial employment index was less affected by the recession than the industrial production index because of a reduction of hours worked by each laborer after 1934.

[13]In particular, Cole and Ohanian (1999, p. 9) define technology shocks "as any exogenous factor that changes the efficiency with which business enterprises transform inputs

(1992) find that between 1929 and 1938 the average annual growth rate of total factor productivity (TFP) in Italy, computed as a Solow residual, was positive, and very similar to the one registered in the previous period (1913-1928). Even their "adjusted" residuals, modified in order to capture scale economies and short-run adjustment costs, point to a lower, but still positive, TFP growth in the years under study. Perri and Quadrini find a small decline in Italy's detrended nonfarm TFP until 1932 but then a rise until the end of the decade, the total decline however being similar to "those observed in other interwar contractions" (Perri and Quadrini 2002, p. 134).[14] The existing evidence therefore suggests that technology shocks cannot explain the length and intensity of the Great Depression in Italy.

Perri and Quadrini (2002) instead assert that trade restrictions were the main cause of the severity and persistence of the recession. *Ad valorem* tariffs, in fact, grew from 4.5 percent in the 1920s to 16.8 per cent in the 1930s (Perri and Quadrini 2002, p. 132). Tariffs were supplemented in Italy also by customs quotas. Being a "beggar thy neighbor" policy, retaliation from other countries was to be expected. In fact, Italian exports declined 36% and imports over 50% in the decade after 1929 (Rossi, Sorgato and Toniolo 1993).

In more detail, Perri and Quadrini (2002) model a two sector (nonfarm tradable vs. nontradable) open economy, in which import tariffs are introduced. To capture another presumed stylised fact of Italy's Great Depression, which we will come back to, the authors simulate a scenario with fixed real wages from 1930 to 1938 and compare it to one with flexible real wages. The introduction of a tariff in 1930 lowers output in both scenarios, due both to the fact that foreign inputs become unavailable to be used in domestic production processes (via the fall in imports) and to the fact that the demand for domestic tradables falls (via the reduction in exports). The real wage rigidity amplifies the (persistent) drop in output. The output loss occurs in both the tradable and nontradable sector, but less in the latter, where relative prices increase. Perri and Quadrini's model "predicts that trade alone can account for one-half of the observed downturn, while real wage rigidities (and thus in a broader sense, monetary shocks) account for one-fourth of the downturn" (Perri and Quadrini 2002, p. 147).

However, the authors do not take into account the possibility that the fall in imports due to tariffs could have actually boosted national produc-

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into outputs. Under this broad definition of technology shocks, changes in productivity reflect not only true changes in technology, but also such other factors as changes in work rules and practices or government regulations that affect the efficiency of production but are exogenous from the perspective of business enterprises." They do not, however, include in this definition acts such as the afore-mentioned NIRA and NLRA, since these did not directly affect efficiency, but, on the contrary, affected nominal prices and wages.

[14]Very recently constructed estimates in Broadberry, Giordano and Zollino (2011, pp. 30 and 36) confirm low, but positive, labour and total factor productivity growth, in the period 1929-1938.

tion. The reduction of imports could have in fact caused a fall in Italian production only if the elasticity of substitution between imported goods and domestic products was low. Yet the idea behind introducing these tariffs, which was a key issue of Mussolini's autarchy plan, was to encourage national industries to produce what previously was imported from abroad, even raw materials, thus stimulating national production. Therefore, the elasticity between imported goods and national goods was at least perceived by contemporaries to be high in the 1930s. Perri and Quadrini acknowledge that their results depend on the calibration of the elasticity of substitution between domestic and foreign tradables. In fact, when experimenting with lower and higher values of this elasticity, they found that higher values yield much smaller output drops. Hence, if the elasticity of substitution was actually higher than the one by them assumed, trade shocks alone would not offer such a satisfactory explanation of Italy's slow recovery. The reduction in trade might have thus only influenced Italy's output negatively in the lapse of time necessary for Italian producers to modify and to adapt their production. Although it is true that this change of activity was neither instantaneous nor without cost, trade restrictions were probably only one of the causes of Italy's negative performance in the 1930s. We will attempt to test empirically if trade restrictions affected the drop in Italian industrial production in Section 4.

Changes in public expenditure or tax rates could also have accounted for Italy's slow recovery. Yet public expenditure relative to GDP rose by 75% over the decade (Ercolani 1978), due to various factors (the creation of public works, the war in Ethiopia, preparation for the Second World War, etc.). On the other hand, direct taxation remained substantially unvaried from 1929 to 1939 (Ercolani 1978), thus introducing no distortionary effects. Hence, if anything, fiscal policy went in the sense of stimulating recovery, rather than restraining it.

A further cause of the slow recovery could be the tight monetary policy Italy pursued. The money supply did fall in those years, a fact which could justify, in a Friedman and Schwartz (1963) framework, the concurrent fall in output. However, from 1935, the money supply began to grow once more in Italy so as to finance the war in Ethiopia. Furthermore, the policymakers' aims to reduce the monetary stock were neutralized by the fact that both banks' and post offices' deposits increased in the same years, as reported in Table 1. We will later explore the effect of monetary policy on prices.

Insert Table 1 about here.

Italy was one of the Gold Bloc countries, remaining on gold even after the U.S. departure from the system in 1933. However, in 1934 it introduced foreign exchange controls and then left the gold standard *de jure* in 1936. It is widely acknowledged that those countries that remained on the gold

standard after 1931 (year in which the U.K. left the system) were the ones that suffered from greater slumps (Eichengreen and Sachs 1985; Bernanke and Carey 1996). Italy was probably no exception. Yet it is important to understand via which channel the deflation induced by the international monetary regime mainly affected Italy's output.

Ripa di Meana (1993) underlines the effect of deflation on output via the interest rate channel: the increase in real interest rates caused investments to fall and firms' debt services to increase, thus leading to their insolvency. However, Mattesini and Quintieri (1997)'s empirical study rejects the real interest rate as an explanatory variable of Italy's output in the 1930s, proxied by the industrial production. What they do find to be significant, on the other hand, is the real wage channel. The deflation in the early 1930s pushed up real wages and real labor costs, thus negatively affecting employment and production. This is the channel we too will focus on.

Finally, a third channel through which the monetary sector could have affected output is the one first described by Bernanke (1983). A high number of bank failures leads to the loss of "information capital", accumulated via relationship-banking, and to an increase in the cost of credit intermediation. This can either encourage banks to increase the interest rates on loans or to ration lending. If interest rates rise, consumers defer consumption, which hence collapses. If loans are not made, investment projects cannot be realized and production suffers. In Italy, the number of Italian banks dropped by 46 per cent, from 3,860 to 2,099 units, between 1929 and 1936 (Mattesini and Quintieri 1997, p. 281). The government intervened swiftly and in partial secrecy to rescue the three main banks, which had adopted a German-type universal-banking model[15], as well as many others, hence avoiding bank runs and the collapse of Italy's banking system (Toniolo 1980). Ferri and Garofalo (1993), however, later stressed how a credit crunch did occur in Italy in the 1930s anyway, thus contributing to the persistence of the Great Depression. Financial instability in fact affected the traditional commercial banks, which accounted for over half of the financial intermediation services.[16]

Yet Mattesini and Quintieri's (1997) later empirical study does not find evidence of the role of financial factors as a major independent determinant of Italy's recession. Furthermore, figures presented in our Table 1 point

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[15]Banca Commerciale Italiana, Credito Italiano and Banco di Roma were Italy's three main 'mixed banks'.

[16]The credit crunch resulted from the increase in the spreads of corporate and government bonds, from the rise of bank rates on assets and on liabilities and from the change in the composition of the banks' balance sheets, more oriented towards less risky assets, such as government bonds. These banks' willingness to lend to the private sector declined, because of their reduced profitability, numerous insolvencies and loss in confidence which induced them to be more wary in lending. In particular, small firms were affected by the credit rationing, whilst the rescue of the three big banks went mainly to the large industrial agglomerates' advantage.

to a growth of nominal deposits in Italy over the 1930s, both in absolute and in relative terms. If we consider the simplified model of intermediation suggested by Cole and Ohanian (1999, p. 18), which equates the loss of information capital due to bank failures to the loss of bank deposits, this implies that the banks which did close down in Italy did not erode the stock of information capital in the banking system.

In conclusion, the presented data point to a significant and long-lasting recession in Italy's industrial sector in the 1930s. Whereas technological and fiscal shocks can quite comfortably be excluded as explanations of Italy's weak recovery, restrictive monetary policies and obstinate adherence to the gold standard, together with trade restrictions, are more likely candidates in explaining Italy's prolonged downturn, yet need to be tested further. The evidence on financial intermediation shocks is, instead, ambiguous, but anyhow is not able to account for more than a small share of the slump. Our attention is instead drawn to the "real wage argument", which deserves greater analysis and microfoundation. The next section focuses in fact on the price and wage mechanisms in Italy during the 1930s, which were strongly affected by government policies in the goods and labor markets, introduced as a reaction to the Great Depression.

3 Price and Wage Policies in Italy in the 1930s

3.1 Cartelization and price policies

It was a widespread belief at the beginning of the 1930s that competition was one of the causes of the slow recovery of the economy, in that it kept wages and prices down, discouraged optimistic business expectations and consequently reduced investment, demand and employment. Hence a common action undertaken by most industrialized countries at the time was the implementation of cartelization policies to fight deflation.[17] Italy was no exception. The powerful Confindustria (Confederation of Italian industry), in fact, fought for a price-raising and wage-cutting policy in order to increase

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[17]The Great Depression was accompanied, in many countries, by an intellectual shift in the paradigm of free competition, in favour of limitations on competition. The 1920s had already sown the seeds for this shift, but the 1930s crisis turned out to be the true watershed. In fact, a famous report by the League of Nations of 1927 still strongly criticised the monopolistic tendencies which were springing up in many countries, mainly pointing a finger at strong worker trade unions, which increased wages and hence prices in a vicious spiral. All Government policies that favoured the creation of monopolies, such as subsidies, custom duties, State-encouraged national and international cartels, were accused of lowering countries' welfare: "All policies of this type are, generally speaking, opposed to the true interests of society and must be condemned precisely for the same reasons as the efforts made by private coalitions to create and exploit monopolies of all kinds" (Cassel 1927, p. 53, free translation from French). Only a few years later, in the face of international events, documents by the League of Nations matured an opposite perspective, especially *vis-à-vis* international cartels.

industrialists' profits and to avoid a further drop in production, as results from documents in the Confederation's historical archives.[18] The Fascist regime strongly supported this view and favored the creation of obligatory cartels (*consorzi obbligatori*) by passing a first pro-collusion law on 16th June 1932.[19] These cartels were considered an emergency measure.[20] However, as such, they could only be created if requested by a high percentage of firms of a particular sector and if deemed to be "necessary" by the government. Alongside these obligatory cartels, voluntary ones (*consorzi volontari*) were also highly encouraged by the same law. The former cartels were necessarily extended to the remaining firms of the sector, whilst the voluntary cartels only included the firms which willingly adhered to them. Confindustria was against a generalized policy of obligatory cartels, but favored the voluntary ones (Confederazione Generale Fascista dell'Industria Italiana, 1933, p. 463). Therefore, apart from three obligatory cartels in the cotton, rice and sulphur industries[21], which actually were a result of specific legislation and not of the general law of 1932, all other cartels were created on a voluntary basis. Another noteworthy law was that of 12th January 1933, no. 141, which required a mandatory government authorization to be able to enlarge existing industrial plants or to create new ones. This law was an obvious extension of the previous one: after having successfully eliminated all competition in a given production sector, it was natural to attempt to block its return with the creation of new firms. This second law therefore helped guarantee the integrity, and the effectiveness, of the existing cartels.[22]

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[18]Much of the information presented in the current section has been extracted from official documents of the *Ufficio Studi e Rilevazioni* (the historical research center) of Confindustria, dating from 1920 to 1942, and thus covering the so-called *ventennio fascista* (the 20-year Fascist regime). These documents are kept in the Fondo Balella of Confindustria's archives.

[19]We are referring to the law no. 864 of 16th June 1932 (*Disposizioni riguardanti la costituzione e il funzionamento dei consorzi fra esercenti uno stesso ramo di attività*).

[20]In Italy, conversely to the U.S. for example, where the Sherman Act had been enacted since 1890, no anti-trust policy existed at the time. The first anti-trust law was, in fact, passed in Italy only in 1990 (Law no. 287 of 10th October 1990). However, the Fascist government still deemed it necessary to introduce two laws in order to encourage cartels, since the number of existing ones was low. It must be recognized that even in the United States, the attitude in the second half of the 1920s was that of a lax anti-trust stance and therefore, from this point of view, did not differ much from Roosevelt's New Deal of the 1930s. See Hawley (1974) and Ebell and Ritschl (2008) on the subject, as well as Hannsgen and Papadimitriou (2009, p. 10) who argue that "NIRA cannot be seen as a government imposition of cartels on a purely competitive system".

[21]Istituto Cotoniero Italiano, Ente Nazionale Risi and Ufficio Unico Vendita Zolfi.

[22]Some forms of cartelisation did also exist in agriculture, yet were of a different type relative to the industrial *consorzi*. As Pitigliani (1940, pp. 395-6) explained, in the period under analysis agricultural cartels were mainly voluntary associations of small land-owners, organized primarily for the purpose of improving production and selling conditions. They were later used to execute specific land-improvement programs of the government. Only in 1938 did a decree recognize agricultural cartels as organizations of "public interest" and require that they become public organizations under complete

The advantages adduced in Confindustria's documents for introducing cartel legislation were the following: a) cartels adjust production to consumption and to the absorbing capacity of the market, guaranteeing the correct quota of workforce to each firm, eliminating stockpiles, stabilizing prices and sales; b) they centralize the purchase of raw materials and the sale of the goods produced, lowering costs and simplifying the two processes; c) they ensure that the risk in production is shared between all the firms; d) they organize exports more efficiently; e) the higher prices that cartels guarantee to the producers allow firms to have greater revenues and to be able to invest in new technologies.

Just as the flourishing of cartels in the United States was a direct consequence of the NIRA, the Italian *consorzi* too significantly increased in number after the enactment of the corresponding legislation, as Table 2 clearly shows. Nearly half of these cartels operated at national level. Initially, the *consorzi* were created in order to reduce competition and to fight deflation, but after the war in Ethiopia in 1935 they were used to help tackle the problems of building up stocks of provisions, of distributing raw materials imported from abroad and of rationalizing Italian resources, hence changing their function. However, most of the 498 cartels existing in 1942 had been created specifically to raise prices and to reduce competition:"(...) with regards to the cartels' functions, it must be underlined that most of the cartels created disciplined the market and production (...). Not only was there a higher number of cartels with these functions, but they were formed before the others. We can thus conclude that cartels in Italy were mostly stimulated by the necessity of reducing competition rather than by the desire to improve production" (Confindustria document, 1942, p. 3, translation from Italian).[23]

Insert Table 2 about here.

16 out of the 22 *Corporazioni* in which the Italian economy was divided by the Fascist regime were affected by cartelization policies (Confindustria document, April 1937).[24] Both processed and unprocessed goods were produced under cartels. Table 3 gives an idea of which sectors were cartelized

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government supervision. Therefore, in the period of interest to us, they were created on a voluntary basis, "confined their attention mostly to the technical problems of the interested groups and were concerned more with purely local interests than with the creation of monopolistic organizations" (Pitigliani, 1940, pp. 395-6). These aims were different, as we shall see, from the ones pursued by the industrial *consorzi*.

[23]It is interesting to note that also the "codes of fair competition", written under the New Deal between 1933 and 1939, aimed mostly at limiting competition by guaranteeing higher prices to producers (Cole and Ohanian, 2001, p. 68).

[24]In detail, the categories in which cartels flourished were the following: clothing; mineral waters, beer and malt; agricultural and food industries, such as coffee, meat, conserves, milk and derivatives, oil; handicraft; paper; cement; lime, plaster and manufactured articles in cement; ceramics; leather; construction; cotton; mining; artificial textile fibers; gas and aqueducts; wool; timber; mechanics and metallurgy; millers and farmers; pasta

by 1940. Between 1929 and 1940 six monopolies also existed, and in 1933 the *Istituto per la Ricostruzione Industriale* (Industrial Reconstruction Institute) was created, which controlled many industries directly, thus further increasing the concentration of Italian industry.[25]

Insert Table 3 about here.

As well as the extension of cartelization in most sectors, it is also interesting to attempt to capture the effect such *consorzi* had on prices. As Toniolo (1980) underlines, it is difficult to measure in precise quantitative terms the role played by cartels in Italy in slowing down the fall in industrial prices, mainly due to lack of data for the period under study. However, in the following three Tables, we offer some data on relative prices of goods produced by cartels for the period 1932–38, immediately following the cartelization laws.[26] One has to be extremely careful when conducting this type of exercise given the fact that specific commodity prices may not have been set on the domestic markets. The products chosen were not object of international cartels in the 1930s, nor were they processed goods based on materials object of international cartels.[27] Furthermore, most of the products selected

and rice; fishing; chemical products; satin; entertainment; various textiles; glass; sugar; various other industries. Therefore, the following *Corporazioni* were involved: clothing; chard and sugar; paper and printing; cereals; chemical products; internal communications; constructions; mining; timber; metallurgy and mechanics; oil; textile products; glass and ceramics; wineries and breweries; zootechnics and fishing.

[25]The monopolies were: Montecatini, which produced the totality of rayon in the country and 75 per cent of chemical fertilizers; Snia Viscosa, which produced 65 per cent of the national production of artificial fibers; Fiat, which produced 83 per cent of automobiles; Pirelli, which produced the total production of rubber and 70 per cent of cables; Edison, which produced 45.5 per cent of electricity; Italcementi, which dominated the building materials industry. See Profumieri (1972) for a detailed description of the monopolies and see Toniolo (1980, p. 250) for a list of the industries under IRI's control.

[26]The sample includes representative goods whose markets were cartelised in 1932 and for which price data exist. The sources used for the prices of goods are Annuario Statistico, various years and Rey (1991). Prices are wholesale or consumer prices, according to the type of good.

[27]For instance, available price data on artificial silk were discarded since the aforementioned Snia Viscosa had entered into an agreement in 1927 with the British and German leading producers in the sector, respectively Courtaulds' and Vereinigte Glanzstoff Fabriken, building up the reputation of the artificial silk industry as a "remarkable example of a world-wide international combination of national units and combines" (Plummer 1938, p. 20). Steel, tinplate and wheat are just a few other examples (concerning the latter, see the table in Société des Nations 1936, p.131, which documents how the price of wheat in importing countries in the 1930s was higher than the price in exporting countries). Interestingly, sulphur, which we consider in our sample, was internationally cartelized until 1932, the year in which our analysis begins, after which the Italian government terminated the International Sulphur Cartel. The creation of the obligatory national cartel in the sulphur industry then followed soon after, with the explicit aim of raising sulphur prices. Finally, it is noteworthy to recall the Italian Government's view on international industrial agreements in the 1930s. Wanting to increase Italy's share of world industrial

in this limited sample were produced directly in Italy.[28] Following Cole and Ohanian (2004, pp. 790–791), we deflated the prices of these representative goods of cartelised sectors by the personal services deflator. The choice of the latter numeraire is dictated by the fact that most personal services were not covered by cartels.[29] This procedure of forming relative prices thus lets us determine whether cartelized prices rose relative to noncartelized prices (services).

<div align="center">

Insert Table 4 about here.
Insert Table 5 about here.
Insert Table 6 about here.

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As the three Tables show, prices of a sample of cartelized products, taken from the textile, clothing, food, construction and chemical industries, rose after 1932, and remained high throughout the 1930s. Hence, even if the Fascist cartels rarely included all the firms of an industry, they seem to have been effective in reducing competition and raising the prices of goods.[30]

What was happening however to aggregate price indices in Italy in this period? Figure 2 shows how consumer prices fell less than wholesale prices in the 1929-1936 period. This discrepancy is explained by Piva and Toniolo

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production and not to keep it constant, the Italian government looked at them "with definite disfavour"; moreover, "the possibility of having to pay more for imports of necessary goods produced almost exclusively by foreign combines is also repugnant to Italian authorities" (Plummer 1938, p. 90). Thus, Italy multiplied restrictions on imports of cartelized products in order to strengthen the position of own producers via import-substitution (Foreman-Peck 1998, p. 619).

[28]An evident exception is coke in Table 6. For this commodity, we first compared the evolution of relative prices in the importer country Italy to the one registered in a producer country such as the U.S. for which we have comparable data in those years (from U.S. Bureau of the Census 1975, Part 1, Section E). By comparing wholesale prices of coal in both countries (deflating both by their respective aggregate wholesale price index and setting them both equal to 100 in 1932), relative prices in Italy show an increasing trend in 1932-1938. This mark-up on the US prices may be seen as a result of domestic price-setting conditions for coal in Italy. A similar cross-check was applied to the two clothing products in Table 4 (in this case using consumer prices) and the increase in relative prices in Italy was again by far greater (and continuous) in 1932-38 than in the U.S..

[29]Two services deflators were available: Rossi, Sorgato and Toniolo (1993)'s total services deflator and Ercolani (1978)'s "various personal services" deflator. If it is true that services such as hotels and restaurants, arts and show business, were unaffected by cartelization, the credit and banking sector was instead dominated by IRI from its creation in 1933 onwards so cannot be considered as competitive sectors. Thus the choice of the second deflator, which nets out the finance sector.

[30]These results are in line with those published by the League of Nations relative to Germany and Belgium (Société des Nations 1931, p. 185): the prices of raw materials in cartelised sectors were found to grow or drop less between 1928 and 1931 than those of non-cartelised sectors in the two countries under study. They also agree with results published in 1936, for the period 1930–1935, relative to Austria, Germany and Poland (Société des Nations 1936, p. 130).

(1988) by the greater rigidity of consumption prices with respect to industrial prices, due to the presence of goods in the consumers' basket which were not subject to international competition and which therefore had less flexible prices. Trade restrictions, introduced in Italy in the 1930s, which increased the relative price of nontradable goods more widely present in the consumers' basket, via an appreciation of the real exchange rate, are another possible cause of this gap. Morris (1998, p. 152) documents how "the regime was convinced that an excessive fragmentation of the distribution sector had been responsible for raising the overheads of individual outlets, and hence the growing differential between wholesale and retail prices". To satisfy the Fascist regime's intention of 'disciplining commerce' via a process of rationalization, a mandatory local authority license allowing trade by any type of *commerciante*, imposed in 1926, was made even harder to obtain by a law passed in 1930. Incumbent retailers soon saw the protectionist possibilities provided by this licensing system, and began complaining about the excessive number of licences granted by local commissions in which a "spirit of electoral recommendation, clientelism and every sort of favouritism was suspected of existing" (Morris 1998, p. 154) Furthermore, the law was very poorly drafted and left much to be determined through interpretations shaped by ministerial decree or simply local decisions. During the 1930s the Fascist Confederation of Commerce challenged "the assumption that retail and wholesale prices ought to move in parallel with each other (...). This was backed by the publications of a whole host of commentators close to the Confederation, who argued that the overheads included in the final price of an item, such as the costs of rents, salaries and heating, and, of course, taxes, might move in a very different direction to the wholesale price, with the result that retail prices would both rise and fall at a slower rate than wholesale ones" (Morris 1999, p. 148).[31] The aim of closing the gap between wholesale and retail prices was never truly pursued by the regime, also because the latter soon realized the political opportunities of this divergence. Zamagni (1981, p. 139), for example, described how in those years the regime, in an attempt to alleviate the dangerous consequences of unemployment, tolerated "the development of petty trade, also to obtain the support of retail salers, not too supportive of the regime". Fighting the fall in retail prices was a means to win the support of this profession. Hence, political motives also contributed to the divergence of wholesale and consumer prices. Finally, cartelization policies too played their role in the matter. The creation of *consorzi* in those years, as well as reducing competition, also changed the sales channels (Pitigliani 1940). As we have seen, these cartels not only centralized the purchase of raw materials, but also the sales of their products, dealing directly with final consumers at determined

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[31]This argument is again related to Piva and Toniolo's claim, since the mentioned items are typical nontradable goods and services which have more rigid prices.

retail prices, and thus completely bypassing the wholesale channel. This too may have affected consumer prices, which remained higher than wholesale prices, the latter often negotiated by single firms turning to wholesalers, rather than by powerful cartels. Whereas the formerly listed factors started biting as of 1929, the impact of cartels was felt as of 1932. After that date in fact the divergence between consumer prices and wholesale prices widened further, as the data show, peaking in April 1934.

Insert Figure 2 about here.

After 1936, Italy's economic and political scenario changed dramatically. A period of inflation began, which led to the institution of a Permanent Committee of Price Controls, and the setting of price caps. In the same year, Mussolini announced his autarchy plan, strongly related to his colonial aims. The definitive departure from the gold standard further marked the end of deflation in Italy.

3.2 Employment and wage policies

Another crucial set of legislation passed by the Fascist regime concerned Italy's labor markets. Since the *Patto di Palazzo Vidoni* of 1925, strongly supported by the then head of Confindustria, Antonio Stefano Benni, only one workers' trade union was allowed to negotiate workers' contracts with the industrialists' union (Confindustria). Workers could hypothetically decide not to join the union, but this was a highly unrealistic possibility, since they were forced to pay fees to the union and to adhere to their rules and decisions in any case. The union leaders were not democratically elected, and often came from the upper classes of society, close to the Fascist regime. The right to strike was abolished and punished with imprisonment since 1925.[32] Finally, the Fascist contracts further eradicated the possibility of creating a national workers' movement by fixing different salaries across regions and across industries.[33]

The original feature of Italy's labor market was its direct and coercive control by the Fascist regime, which exogenously set wages. In particular, the 1930s labor policies aimed at keeping wages, deflated by consumer prices, constant at a subsistence level corresponding to around 15 lire (1938 prices) (Zamagni, 1976, p. 337). Therefore, initially as a consequence of the massive deflation due to the return to the gold standard, the government enacted a series of wage cuts in order to maintain this target, but also to accommodate the industrialists' requests of keeping their profits unvaried, notwithstanding

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[32]The reason why strikes became illegal was because the regime introduced a special court, the *Magistratura del Lavoro*, to which workers were supposed to appeal when necessary. "Self-defence" was not allowed anymore (Bottai 1929, p. 182).

[33]See Zamagni (1976, pp. 374-377) for the figures on nominal wages across regions.

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the fall in prices. When the Great Depression then broke out, the new reason for introducing these measures was that, to keep employment levels constant, the workers' purchasing power had to be sacrificed. In the industrial sector, the first cut, introduced by law, was of 20 per cent in 1927 with further cuts undertaken in 1930 (8 per cent), 1933 and 1934 (cumulatively, another 10 per cent). Table 7 presents data on hourly average wages for different industries, in which the effect of the enforced wage cuts can be seen in all sectors.[34]

Insert Table 7 about here.

If on the one hand, the Italian government encouraged the creation of cartels in order to rationalize production and the corresponding costs and to keep industrial revenues as high as possible via price increases, on the other, it imposed a reduction in production costs by dictatorially lowering labor expenses.[35]

What happened to industrial real wages after 1929, also as a result of government intervention on both prices and wages? Given the fixed target, nominal wages declined similarly to consumer prices. However, as seen in Section 3.1, the decline in wholesale prices was more pronounced relative to consumer prices. The different degree of reduction of the two price index series thus had a diverging effect on real wages. Figure 3 plots the two de-trended industrial real wage series in the period 1929–1936. The *own product* real wage, i.e. the real wage deflated by the wholesale price index, grew by around 40 per cent until 1934, with a consequent increase of labor costs for firms. Real wages deflated by the consumption price index remained instead more or less constant, thus proving the lack of a corresponding increase in workers' purchasing power and the "success" of the government's wage-targeting policy.

Insert Figure 3 about here.

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[34]The trade union's weak opposition to these wage cuts was due to the fact that the union was a projection of the regime. It must be recognized, however, that social insurance and other forms of pensions and subsidies were also introduced in these years. Another factor that contributed to the creation of a form of "tacit consensus" was the contemporary increase in employment in public administration, to mitigate unemployment in the middle class, "the mass political backbone of Fascism" (Piva and Toniolo, 1988, p. 242). Just to report some figures, whereas employment in the industrial sector dropped by 28 per cent between 1929 and 1932, it increased in Government services by 21 per cent in those same years (elaborations on Broadberry, Giordano and Zollino 2011).

[35]Recall that a link, however different, also existed between the NIRA's cartelization and wage policies. Prices in the United States were allowed to rise to expand industrialists' profits only if wages were also increased, in order to sustain workers' purchasing power. Hence, in both countries, legislation concerning market structure was necessarily accompanied by wage policies, albeit radically different.

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The rise in real wages and thus of labor costs was accompanied by a significant fall in employment, as already seen in Figure 1. The migration of labor from the agricultural sector to industry and the drop in overseas emigration due to strict laws on immigration abroad also contributed to the increase in industrial unemployment rates.

Wage cuts were not, however, the only labor-market measure undertaken by the Fascist regime. Many public works were inaugurated, such as the famous *bonifica integrale* (land reclamation) in order to fight unemployment, but according to data published by Piva and Toniolo (1988), the results were not satisfactory in terms of absorption of excess labor supply. The introduction of work-sharing, that is of a work week of a maximum of 40 hours, enforced by a law in 1934, was more effective as a measure against unemployment (Mattesini and Quintieri, 2005). Finally, a fourth labor policy concerned the introduction of unemployment subsidies, which are known, however, to possibly entail a rise in unemployment, rather than its decrease. Yet in the 1930s the beneficiaries were few and the actual subsidies were extremely low, even when compared to the contemporary meager wages.[36]

The inflation beginning in 1935 was accompanied by a drop in real wages, in spite of the introduction of the Permanent Committee of Control of Prices and of a series of wage increases enacted by the government in 1936, 1937, 1939 and 1940. The rise in real wages was therefore limited to the years 1929–1934. After 1936, employment too returned to its pre-crisis level and continued to grow until 1939.

In conclusion, in Italy the interwar period was characterized by heavy government intervention in both the goods and labor markets. On the one hand, via cartels, the aim was to fight deflation; consumer prices received however more support than wholesale prices, due to political reasons, but also possibly due to the way cartels were structured and to the distorting effects of trade restrictions. One the other hand, to combat the *effects* of deflation, wage cuts were introduced with the clear intent of keeping workers' purchasing power unvaried. With this target in mind, however, the government clearly ignored the problem of rising labor costs for firms, represented by nominal wages deflated by wholesale prices, to which it responded by further encouraging cartelization and price increases in most industrial sectors hoping to keep the the profits of industrialists - sorely needed by Mussolini in his political and economic ventures - stable. Fascist industrial policy seemed hence to respond more to political priorities rather than to economic growth incentives. The drawbacks of these policies will become clear in the following Section.

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[36]For a detailed description of the complete set of Fascist labor policies, see Piva and Toniolo (1988).

4 Depression-era industrial supply relationships in Italy

4.1 Evidence of a structural break

Figure 1, although based on average annual data, suggests the existence of a structural break in Italy's industrial production index (IPI) series in the years 1929-1936, namely in 1932. Before attempting to pinpoint the determinants of Depression-era industrial output in Italy, the first step in our empirical analysis is to test for and to date this potential structural break in the period under study, in order to improve the fit of the regressions in the second part of our analysis. We hence revert to the deseasonalized monthly IPI data, underlying the annual averages reported in Figure 1.

Not wanting to impose a break *a priori*, in order to empirically test for its existence and for its exact timing, we use one of the most recently developed tests for structural change in univariate time series. The test devised by Kim and Perron (2009) is particularly congenial to our scope. First, it has the desirable property of being implemented to search for an unknown break date, which may occur under both the hypotheses of stationarity or nonstationarity.[37] Secondly, if the series actually exhibits a break, the Kim-Perron test exploits this information to improve the power of the test itself. Finally, simulation experiments confirm that this test offers an improvement over the previous methods in small samples.[38]

Kim and Perron devise level-shift models, changing-growth models and "mixed" models, which allow for shifts in both the level and slope. Furthermore, their test verifies the existence either of an additive outlier (AO), which captures a sudden change in the series due to a transitory shock or to an anomaly in the data, or alternatively of an innovational outlier (IO), which implies a gradual shift in time of the mean of the series.[39]

Not having any reason to restrict ourselves to either level or slope shifts, we implemented the more general "mixed" model.[40] An IO model also seems more appropriate, since a persistent shock which influenced the variables of interest for a longer time period seems more likely in this context. The test conducted points to the existence of a (significant) structural break in

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[37]Conversely, the commonly used Zivot-Andrews test (Zivot and Andrews 1992) assumes that, if a break occurs, it does so under the stationarity hypothesis.

[38]The number of observations in our sample is, in fact, relatively small: we rely on 93 monthly observations.

[39]An AO only affects the level of the Tth observation, where T is the time the shock occurs. An IO represents a shock at time T which influences the variables of interest from T onwards through the memory of the system.

[40]Beforehand, we proceeded to use another test, the Clemente, Montañés and Reyes test (1998), which tests for the coexistence of two structural breaks. Not having found any evidence in favor of the existence of a second breakpoint, we were reassured into implementing a single-break routine.

November 1932.[41] This result is reassuring as it fits in with historical facts and with the visual inspection of Figure 1, which we consciously decided to ignore when testing for the break.

4.2 The countercyclicality of real wages and nominal wage stickiness

Having found evidence of the presence of a break in Italy's IPI series in the period 1929–1936, the emphasis now shifts to analyzing the single determinants of this index.

As a reference model, we use a study by Bernanke and Carey (1996) (hereinafter B-C), which, in turn, builds on earlier work by Eichengreen and Sachs (1985)(hereinafter E-S). Whilst the latter use a cross-section of ten industrialised countries, including Italy, in the year 1935, B-C work with panel data, in particular a sample of 22 countries over the period 1931-1936. We instead move along a higher-frequency (monthly) time series dimension, focusing on Italy in the longer period 1929–1936. We do not consider the whole decade, due to significant policy shifts in 1936 when Mussolini introduced his fully-fledged autarchy plan, the gold standard was definitely abandoned, international trade rebounded, prices and wages began to steadily rise and employment levels were back on trend. Our analysis thus ends before these structural changes in the Italian economy.

A. The output equation

We begin with an extremely basic model – the output equation suggested by E-S – whose aim is to highlight the countercyclical behavior of real wages. In Equation 1, the dependent variable, IPI, is regressed uniquely against a constant and the real wage, constructed as a ratio between the average nominal industrial wage and the wholesale price index.[42] The wage used is hourly, in order to avoid confounding changes in hourly pay with changes in workweeks, which were common during the Great Depression.[43] We deflate the wages by the wholesale price index, in line with E-S and B-C, to obtain a measure of labor costs, rather than of workers' purchasing power, as previously discussed in Section 3.1.[44] All variables are in logarithmic form. We refer to the Appendix for a discussion of the data used in

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[41]An AO "mixed" model points, instead, to the existence of a break in August 1932. The estimation results presented in the following paragraphs were found to be robust also to this second breakpoint, only three months previous to the IO model one.

[42]This, and all following regressions, were run using 32-bit Stata 11.

[43]In Italy in 1934 the workweek was reduced in order to mitigate unemployment. See Mattesini and Quintieri (2006) on the effects of this policy change.

[44]In explicit contrast to E-S and B-C, Cole, Ohanian and Leung (2005) use the GDP deflator to deflate their nominal wage index. However, their output measurement is GDP. Having already expressed our reserves concerning Italy's GDP data in Section 2, we continue to focus solely on the industrial sector and on the IPI; hence our wholesales price deflator is appropriate.

this Section.

$$IPI_t = \alpha + \beta realwage_t + \epsilon_t \qquad (1)$$

Having found evidence of heteroskedasticity and serial correlation in the error terms, the estimation method used is a Generalized Linear Model (GLM) with a Newey-West HAC variance-covariance matrix.[45] The estimated coefficients are reported in Table 8, row 1, in which the p-values are expressed in brackets under the corresponding variables.

Insert Table 8 about here.

The countercyclical nature of real wages in the period under study emerges from this simplified model. Furthermore, our results fit in with those found by E-S, who concluded that "[t]he clear negative relationship [between industrial production and real wages] indicates that supply considerations strongly influenced the rate of economic recovery" (Eichengreen and Sachs 1985, p. 941). An increase in the real wage faced by firms lowered industrial production. Not surprisingly, however, the fit of the equation is poor, due to the fact that, given real wages, other factors probably affected industrial output.

We thus improve the fit, by estimating a new output supply equation, Equation 2, which is a variant of the one presented in B-C.

$$IPI_t = \alpha + \beta_1 wage_t + \beta_2 price_t + \beta_3 laggedIPI_t + \beta_4 openimpt_t + \qquad (2)$$
$$+\beta_5 spread_t + \beta_6 DU_t + \epsilon_t$$

We hence allow the two components of the real wage variable to enter separately in the equation, as in B-C, in order to disentangle the contribution of each component to the dependent aggregate output. The expected coefficients are positive for the price variable and negative for the wage variable, thus confirming the countercyclicality of real wages. As in B-C, we also introduce lagged output, assuming the existence of adjustment costs (in hiring or in reactivating facilities, for example) which prevent immediate changes in industrial output. The expected sign of its coefficient is positive. We also consider three other explanatory variables, not included in B-C's model, which instead should be investigated in the Italian case. The variable *openimport* is a ratio of an Italian import index and a world production index. The expected sign is ambiguous. In fact, if world production falls,

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[45]In particular, we ran Breusch-Pagan/Cook-Weisberg and White tests to test for heteroskedasticity and Durbin-Watson and Breusch-Godfrey tests for serial correlation. The number of lags used in the GLM estimation was derived by the Schwert criterion. The estimation results found in this, and the following equations, are also robust to a Generalized Least Square (GLS) estimation method, here not reported.

Italy, being a small open economy, should suffer from the negative international slump. However, if imports drop, we could expect two contrasting effects. On the one hand, a fall in imported raw materials could slow down production, since Italy was lacking such inputs; on the other, the decline could bring on a rise in import-substitution production. We also control for an indicator of turbulence in financial markets, the spread between interest rates on government consols and industrial bonds, which may negatively affect industrial production. Finally the information obtained in Section 4.1 concerning the timing of the break in the IPI series is exploited to construct a time dummy, which takes value 1 for all the months subsequent to the break and value 0 for the months preceding it.

B-C also considered two other explanatory variables in their model. The first is a dummy variable that indicates periods of banking panics, which reflect negatively on production since they disrupt the normal credit flow to firms. As recalled in Section 2, the Fascist government secretly intervened to save the three main mixed banks from bankruptcy, so banking panics and runs did not actually occur in Italy in the 1930s. Ferri and Garofalo (1993), however, bring evidence in favour of the existence of a credit crunch, in particular of small banks withdrawing their supply of credit to small, local firms, which thus became insolvent. Yet, when controlling for this crunch, via a dummy variable indicating the number of firm failures in the period considered, the latter variable turns out to be not significant. Hence, if not specifically for a banking crisis, we prefer to control, as previously stated, for a more general situation of financial crisis, via the spread of bond yields.

The other variable introduced by B-C is a dummy that represents the number of days lost to strikes and to other work stoppages, which interrupt the normal production cycle. In the case of Italy, this variable is not considered relevant owing to the fact that strike was illegal under the Fascist regime and thus extremely rare.[46]

We therefore obtained a second output equation, Equation 2, whose estimated coefficients are reported in Table 8, row 2. The variables are all significant at a 5% level, except for the spread variable, and the sign of their coefficients are those expected. Real wages are again shown to be negatively correlated with the IPI in the period under study. The changes in output are not immediate, but are hindered by adjustment costs. The *openimport* variable, interestingly, has a negative sign. The driver of the negative correlation is the import index.[47] A decrease in Italian imports, *ceteris paribus*, went hand in hand with an increase of Italian industrial production. This implies that Italian producers tended to replace previously imported goods with domestic production, hence stimulating overall output.

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[46]Refer to the Fascist union policies briefly illustrated in Section 3.2.

[47]In fact, when introducing the two variables separately, in another specification of the model here not reported, the world production index is significant and positively correlated with Italy's industrial output, as expected.

This import-substitution aim was, in fact, what Mussolini had in mind when devising his autarchy plan. Financial turbulence does not seem to have been an important factor in explaining Italy's negative industrial performance in the 1930s. Finally, the structural break dummy is significant, confirming the result obtained in Section 4.1. We define this second regression our (industrial) "output equation".

In a variant of Equation 2, here not reported, if we drop the explanatory variable of wholesale prices, and replace it with the gap between consumer and wholesale prices, the latter enters significantly in the regression, and with a negative sign. This therefore seems to confirm the evidence that the price policies we recalled in Section 3.1 stalled, rather than boosted, industrial activity.[48]

Regression (3) simply introduces the composite real wage variable into regression (2), therefore replacing the wage and price variables, in order to better quantify the relationship between this explanatory variable and the dependent variable. Results are displayed in Table 8, row 3. The magnitude of the real wage's coefficient suggests the relevance of this variable in explaining the variance in Italy's industrial production in the Great Depression era. Only lagged industrial output has a larger coefficient, of the opposite sign.

B-C also address the problem that even by introducing additional regressors with respect to E-S's original model, thus reducing the issue of omitted variables, they may not have captured all the factors that influence output, such as technological shocks, changes in the composition of output and of the workforce, etc. Since supply shocks affect prices and wages, there could be an endogeneity problem, overcome in their case by using instrumental variables.

We address this potential issue by estimating our equation using the two-stage least squares (2SLS) method and in particular, by instrumenting the price variable with two instrumental variables. The first one is the discount rate, which reflects the domestic interest rate. In a country on the gold standard, such as Italy, this variable is more significant in proxying monetary policy than the country's monetary base, since the national policymaker did not have control over the country's monetary supply (Bernanke and Carey 1996, p. 868). Another instrumental variable we use is the ratio between the sum of Italy's imports and exports and the sum of the US's imports and exports. The intuition behind this instrument is that we were searching for a proxy of tariffs and other trade restrictions, for which monthly data are not available. By building this monthly ratio we however get an idea of Italy's trade closure relative to a country, the US, which also restricted its trade in

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[48]Since trade restrictions may have contributed to the widening gap between consumer and industrial prices, as suggested in Section 3.1, then their negative role may be reconsidered under this light. Hence, their potentially damaging role was exerted via this price-gap channel, rather than through the import-reduction channel.

the Great Depression years.[49]. In fact, trade restrictions in both countries affected imports, but also exports negatively, owing to documented retaliations by other countries. The ratio constructed falls if Italy experiences a higher reduction in trade compared to the US, possibly due to greater trade restrictions in the former country than in the latter.

The results of our first-stage least squares regression are encouraging. Both instruments are significant (p-value 0.000) in explaining the variance in wholesale prices. Interestingly, the discount rate exhibits a positive sign, probably implying a lag of Italian monetary policy in reacting to price changes which fits in well with the historical context. The Italy vs. US trade instrumental variable instead has a negative sign. The reduction in the ratio, suggesting greater trade restrictions in Italy than in the US, is thus accompanied by a rise in Italy's domestic prices. Estimation results of the second-stage least squares confirm the relations between industrial production and explanatory variables which we have previously discussed relative to Equation 2. However, a Durbin-Wu-Hausman difference test on our price variable cannot lead us to reject (p-value 0.4273) the null hypothesis which states that an OLS estimate yields consistent estimates. Therefore, we can presume that an endogeneity problem does not affect the results presented in Table 8 and we can revert back to our GLM model which yields more efficient estimates than the 2SLS in this case.[50]

B. The wage adjustment equation

As a second key component of their model, E-S also present a wage-adjustment equation, in which, however, they introduce an extreme simplification. They assume, in fact, perfect nominal wage rigidity, that is to say an indefinitely constant wage. Following B-C's later work, we here attempt to offer a more realistic model, allowing for dynamic influences, in which the wage depends on its lagged value. We therefore regress current nominal wages against their lagged value and against contemporaneous prices, as reported in Equation 3. Whereas γ_2 measures the degree to which wages respond to contemporaneous price movements, and is expected to be positive, γ_1 is a measure of nominal wage stickiness. As in B-C, following work on the Phillips curve, we also allow the wage level to be affected by both the unemployment rate and the change in the unemployment rate.

$$wage_t = \delta + \gamma_1 wage_{t-1} + \gamma_2 price_t + \gamma_3 unempl_t + \gamma_4 diffunempl_t + \epsilon*_t \quad (3)$$

Insert Table 9 about here.

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[49]The U.S. Smoot-Hawly Tariff Act of 1930 is emblematic in this sense

[50]Ideally, one would also have to control for technology shocks, using measures of TFP for example, as described in Section 2; high-frequency data of this variable of interest however are not available.

The results, again obtained by implementing a GLM procedure with Newey-West HAC standard errors, due to the presence of a lagged dependent variable and of tested serial correlation, are reported in Table 9. The lagged wage and price variables are statistically significant and both present positive signs. Interestingly both the unemployment rate and its variation are not significant. Wage determination in Italian industry in the 1930s was not correlated with the rate of unemployment nor to differenced unemployment. This may be due to the fact that wages were subject to mandatory wage cuts imposed by the Fascist regime, as explained in Section 3.2, rather than being the result of clearing market forces.

Two Wald tests also confirm the presence of nominal wage stickiness. The first test sets, as a joint null hypothesis, the lagged wage coefficient to zero and the price coefficient to one. If it were not rejected, wages would vary immediately and in direct proportion to changes in prices, due to aggregate demand shocks. However, the null is categorically rejected (p-value 0.0000), providing strong evidence of a slow adjustment in wages. The second test is less restrictive than the first, in that the null asserts that the two coefficients in question sum to one. Again the null is rejected (p-value 0.0020), providing more evidence in favor of nominal wage inertia.

As in the output equation case, we address the potential endogeneity issue, linked to the price variable, by estimating the wage adjustment equation with 2SLS and by using the two previously defined instruments. Results in the first-stage regression are similar to the ones discussed relative to Equation 2. Again, by running a Durbin-Wu-Hausman test, the null hypothesis of exogeneity cannot be rejected (p-value 0.5453).

C. The industrial supply equation

Finally, as in B-C, we estimate the output and the wage adjustment equations jointly. If we substitute Equation 3 in Equation 2, we obtain the following supply equation:

$$IPI_t = (\alpha + \delta) + (\beta_2 + \gamma_2)price_t + \beta_3 laggedIPI_t + \beta_4 openimp_t + \beta_5 spread_t + \quad (4)$$
$$+ \beta_6 DU_t + \gamma_1 wage_{t-1} + \gamma_3 unempl_t + (\epsilon_t + \epsilon*_t)$$

The industrial production index is linked to the current price level, the lagged level of output, the openimp index, the financial spread and the break dummy; it is also affected by the lagged nominal wage and the current unemployment rate, through the effect of those two variables on the current nominal wage.[51] We estimate Equation 4 via GLM with Newey-West HAC standard errors.

Insert Table 10 about here.

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[51]As in B-C, we omit the differenced unemployment rate.

The results confirm those already reported. Estimates are all significant (except for the spread variable once again, and the lagged wage) and are of the correct sign. The price variable is still positively correlated with the dependent variable, but its coefficient is of a smaller magnitude than in Equation 2, as expected since the current nominal wage variable has disappeared from this new specification. Interestingly, unemployment enters this equation significantly, with a depressing effect on industrial production.[52] Again, exogeneity is not rejected (p-value 0.7738) by a Durbin-Wu-Hausman test.

In conclusion, in this section, we have verified the existence of a strong inverse relationship between industrial output and real wages in the period 1929–1936, as well as of nominal wage stickiness. Despite our many modifications, our findings hence broadly concur with the original conclusions of Eichengreen and Sachs (1985) and of Bernanke and Carey (1996). An interesting observation to be made is why the wages were sticky in presence of widespread unemployment. Both Bernanke and Carey (1996) and Cole and Ohanian (1999) exclude the standard reasons for nominal wage inflexibility - money illusion and explicit nominal contracts - as the cause of the increase in real wages registered in the 1930s in the US. We believe that these standard reasons are similarly not convincing in the Italian context. Money illusion, in fact, could not have been compatible with the conjectured optimizing behavior of agents, with the long duration of the recession and with the exceptionally high unemployment rate. The existence of long-term labor contracts is also not a feasible explanation, in that the Italian workforce's bargaining power under the Fascist regime evaporated. The Fascist wage and price policies were instead a possible source of nominal wage stickiness. In particular, the nominal wage policy aimed at keeping consumer real wages (i.e. daily nominal wage deflated by CPI) constant at 1929 levels, combined with the deflation of the WPI relative to CPI, meant that the wage cuts were too small from the firms' point of view. If workers' purchasing power was successfully kept constant, labor costs instead increased, in turn, slowing down production. Finally, we also found evidence of a minor role played by trade restrictions in depressing Italy's output via a reduction of imports in the Great Depression years, as well as confirming the negligible impact of financial turbulence.

5   Conclusions

The policies undertaken during Italy's interwar period by the Fascist government present interesting analogies with those enacted by President Roosevelt in the United States. Cartels were encouraged and intervention in the

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[52]In the original B-C model, the unemployment variable also gained more significance in the supply equation relative to the wage adjustment equation (Bernanke and Carey 1996, p. 877).

labor market was a common feature. President Roosevelt, as well as raising prices to favor industrialists, also increased workers' bargaining power and, therefore, their wages. The Fascist government, on the contrary, being more attentive to industrialists' concerns, on the one hand fought the drop in consumer prices, but on the other, abolished most of the workers' bargaining power and intervened systematically in cutting wages. The two concurrent aims of boosting consumer prices and of targeting a constant real wage in turn meant that firms' labor costs rose over the period 1929-1936. In fact, this entanglement of policy targets, deriving from a tug-of-war between the two competing aims of stimulating the Italian economy and of consolidating and increasing the government's political consensus, had the undesired combined effect of pushing up own product real wages.

In our empirical analysis we study more closely the determinants of Italy's industrial downturn in the 1930s, by relating the IPI series to wholesale prices, nominal wages, lagged industrial production, imports, world production, yield spreads and a dummy variable capturing the structural break in the series. Whilst the countercylicality of real wages emerges from the output equation, nominal wage stickiness results from the wage adjustment equation. The final aggregate supply equation further suggests a negative correlation between industrial output and unemployment. All this concurs with previous evidence in the literature on the Great Depression of supply considerations affecting the rate of recovery in the industrial sector. The Fascist mandatory wage cuts aimed at keeping consumer real wages steady, coupled with price controls and obligatory cartels that contributed to the rigidity of consumer prices relative to wholesale prices, pushed up firms' labor costs, in turn lowering industrial production. In conclusion, the politicization of price and wage-determination arising from the need of the Fascist regime to protect the income shares of key interest groups (e.g. industrialists, retailers, etc.) in order to win their political support turns out to be an important factor in explaining the long and severe slump in Italy's industry in the first half of the 1930s.

Furthermore, the paper brings evidence to the fact that, whereas financial market unrest does not appear to have been a significant factor in the downturn, it is noteworthy that Italy's industrial production did not suffer from a reduction in imports. On the contrary, the import-substitution process by domestic production, seems to have been effective in boosting output. This result is particularly interesting as it re-opens up the debate on the importance of trade restrictions in explaining Italy's Great Depression. In fact, Perri and Quadrini (2002)'s result, which attributes 50 per cent of Italy's slump to tariffs and similar barriers to trade, is strongly dependent on a low elasticity of substitution between imported goods and domestic goods. Our analysis instead suggests a higher elasticity than the one by them used in their calibration exercise, and hence downsizes, if not altogether overturns, the negative role played by trade restrictions.

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The results of this paper therefore fit in well with the literature stressing government mismanagement as a potential drag on growth in Italy's industrial sector in the 1930s, yet they point a finger at the microeconomic wage and price policies rather than at the standard macroeconomic monetary and trade ones.

Data Appendix

Reliable data concerning Italy in the 1930s are extremely hard to come by, also due to the particular political regime of the time, which in some cases actually suspended the publication of sensitive statistics, such as those on unemployment. In this paper, we have, however, used official data, from national and international sources, as well as data derived from reconstructions by renowned academic scholars.

GDP data plotted in Figure 1 are from Rossi, Sorgato and Toniolo (1993). The industrial production index is an annual average of a monthly index published in Ministero delle Corporazioni, *Sindacato e Corporazione*, various issues. The latter was obtained as a geometric average of five sectoral indices, here listed followed by their weights in brackets, reflecting the size of each sector derived from the 1927 industrial census: textiles (37%), metallurgical and engineering (36%), paper (3%), construction (19%), energy, gas and electricity (5%). Each index is obtained in turn by aggregating elementary indices listed in *Sindacato e corporazione*, July-August 1934, p. 185. The original aggregate index was not deseasonalized since the "influence of the negative cycle had deeply altered the seasonal fluctuations" (p. 186); hence our deseasonalization in Section 4.1. Although the index includes both tradable and nontradable (i.e. construction, utilities) sectors, it is noteworthy that all the sectors constituting the index were cartelized after 1932. The index thus captures the effects of the Fascist government's cartelization policies. Finally, the industrial employment index is an annual average from Istituto Centrale di Statistica del Regno d'Italia, *Annali di Statistica*, series VIII, vol.9.

The figures on nominal deposits, in Table 1, are from Ercolani (1978). Money stocks are from Ripa di Meana (1993), in turn elaborations on De Mattia (1965) and Gatti (1986). U.S. price data are from the U.S. Bureau of the Census (1975).

The data on nominal prices used to construct the relative prices of cartelized goods in Tables 4 to 6 are from ISTAT (1938) and Rey (1991). The deflators used are instead from Ercolani (1978).

In Section 3.2, data on nominal wages by industrial sector are from Zamagni (1976). Monthly data on prices (wholesale and consumer indexes) are taken from ISTAT, *Bollettino Statistico*, various issues.

Finally, data used in the Section 4.2 come from different sources. The Italian IPI index is the monthly index coming from the same source as the one in Figure 1. The world production index is from League of Nations, *Statistical Yearbook*, various issues. It is a weighted average of 24 countries' industrial production indices (see, for example, Société des Nations, 1936, pp. 20–22). The price index (as before), the yields on industrial bonds and on government bonds, and the discount rate are from ISTAT, *Bollettino Statistico*, various issues. The Italian import and export indices were

derived from *Bollettino di Notizie Economiche*, various issues, whereas the U.S. ones come from the U.S. Bureau of the Census (1975). Finally, the nominal industrial wage and the industrial unemployment index are taken from Zamagni (1994).

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Year	Nominal money stock	Real money stock	Deposits
1929	16.9	3.8	75.76
1930	15.7	3.6	77.18
1931	12.3	3.7	76.99
1932	13.7	3.6	75.04
1933	13.2	3.7	78.12
1934	13.1	3.9	76.68
1935	16.6	4.8	73.00
1936	17.6	4.8	80.60

Table 1: Money stock and nominal deposits in Italy (billions of lire), 1929-1936. Source: Ripa di Meana (1993) and Ercolani (1978).

Year of constitution	PRM	PRM & PC	PRM & PC &MC	PC	PC & MC	MC	Total
1907				1			1
1913			1				1
1919				1			1
1922					1		1
1923			1			1	2
1926			1			1	2
1927						2	2
1928			1			2	3
1929			1			1	2
1930				1		2	3
1931				1	4	2	7
1932	1				5	3	9
1933			1	3	1	8	13
1934	2			1	7	11	21
1935	2	1	2	2	23	7	37
1936	5	1	6		24	16	52
1937	1		1	4	22	31	59
1938			2	2	22	39	65
1939		1	2	3	35	46	87

Legend: PRM = purchase of raw materials; PC = production control; MC = market control.

Table 2: Number and function of new Italian *consorzi*. Source: 1942 anonymous document from Fondo Balella, Confindustria historical archives.

Industry	Number of *consorzi*
Mining	13
Metal	16
Chemical	35
Building	22
Glass and Ceramics	16
Timber	9
Textile	19
Clothing	10
Tanning	3
Paper	69
Other	11
Food	219
Entertainment	9
Transport	7
Total	498

Table 3: Number of cartels per industry in 1940. Source: Anonymous document from Fondo Balella, Confindustria's historical archives.

Year	Hemp	Wool	Man's suit	Woman's suit
1932	100.00	100.00	100.00	100.00
1933	111.64	125.69	103.14	100.36
1934	115.52	160.29	104.94	100.80
1935	174.39	278.75	112.93	109.19
1936	199.36	392.99	131.75	132.29
1937	199.96	418.08	154.62	158.37
1938	197.12	417.09	174.32	177.88

Table 4: Relative prices in the textile and clothes industries. Sources: elaborations on ISTAT (1938), Rey (1991), Ercolani (1978).

Year	Pasta	Wine	Olive oil	Coffee	Veal	Pork	Eggs
1932	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1933	103.39	126.92	92.36	105.25	101.80	111.48	103.75
1934	101.19	132.10	106.11	107.13	104.84	113.03	103.88
1935	102.88	135.78	117.06	110.00	107.85	109.66	107.17
1936	101.04	115.34	115.62	109.62	104.97	103.70	112.86
1937	102.66	114.23	134.71	106.56	117.82	122.69	109.89
1938	92.35	128.59	118.80	92.63	113.18	119.89	106.34

Table 5: Relative prices in the food industries. Sources: elaborations on ISTAT (1938), Rey (1991), Ercolani (1978).

Year	Cement	Bricks	Coke	Sulphur
1932	100.00	100.00	100.00	100.00
1933	103.97	106.34	101.66	107.72
1934	129.84	112.08	102.92	109.17
1935	132.16	116.83	97.78	105.35
1936	140.40	116.83	135.17	101.49
1937	133.87	111.25	160.57	98.74
1938	125.77	117.07	153.01	91.73

Table 6: Relative prices of representative goods for different industries. Sources: elaborations on ISTAT (1938), Rey(1991), Ercolani (1978).

	Agricultural	Mining	Housing	Building materials	Mechanics & metallurgy	Textile & clothing	Chemical	Paper & printing	Timber	Other	Total average
1928	2.14	2.26	2.40	2.15	2.75	1.64	2.34	2.33	2.04	1.58	2.10
1929	2.05	2.33	2.34	2.19	2.64	1.64	2.09	2.22	2.05	1.67	2.07
1930	2.05	2.30	2.43	2.28	2.75	1.63	2.23	2.22	1.97	1.75	2.10
1931	1.85	2.11	2.18	2.08	2.58	1.47	2.06	2.07	1.94	1.66	1.94
1932	1.97	1.93	2.14	2.04	2.47	1.42	2.04	2.13	1.88	1.91	1.91
1933	1.99	1.97	2.02	1.95	2.47	1.33	2.06	2.08	1.79	1.75	1.86
1934	1.91	1.89	2.06	1.95	2.37	1.38	2.02	1.98	1.73	1.64	1.84
1935	1.67	1.81	1.91	1.80	2.22	1.42	1.86	1.83	1.61	1.73	1.74
1936	1.57	1.80	1.89	1.84	2.29	1.33	1.91	1.81	1.62	1.74	1.82
1937	1.74	1.95	2.04	1.97	2.57	1.44	2.11	1.94	1.70	1.85	1.98
1938	2.03	2.25	2.31	2.23	2.87	1.65	2.36	2.16	1.94	2.17	2.24
1939	2.20	2.38	2.61	2.43	3.16	1.95	2.60	2.49	2.08	2.42	2.50

Table 7: Average hourly wages by industry. Source: Zamagni (1976), pp. 374–375. Note: Wages were reported in the month of April of each year.

Dependent variable: Industrial production
Independent variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	constant	realwage	wage	price	laggedipi	openimport	spread	dummy
1.	4.697	-0.987	-	-	-	-	-	-
	(0.000)	(0.000)	-	-	-	-	-	-
2.	0.065	-	-0.391	0.670	0.718	-0.168	-0.013	0.030
	(0.939)	-	(0.030)	(0.000)	(0.000)	(0.000)	(0.703)	(0.016)
3.	0.128	-0.670	-	-	0.733	-0.145	-0.016	0.016
	(0.000)	(0.000)	-	-	(0.000)	(0.000)	(0.657)	(0.094)

Legend: Regression 1 is the Eichengreen-Sachs equation in which industrial production is regressed against a constant and real wages. Regression 2 is a variant of the Bernanke-Carey output equation, in which industrial production is regressed against a constant, nominal wages, wholesale prices, lagged industrial production, the ratio between imports and world production index, the spread on bond yields and a structural break dummy. Regression 3 introduces the composite real wage variable into regression 2. The estimation method used is a GLM with Newey-West HAC standard errors. P-values are reported in brackets under the corresponding values.

Table 8: The estimated output equation

Dependent variable: Nominal wage
Independent variables

(1)	(2)	(3)	(4)	(5)
constant	laggedwage	price	unempl	diffunempl
0.575	0.838	0.043	-0.005	0.004
(0.045)	(0.000)	(0.045)	(0.317)	(0.750)

Legend: We here regress nominal wages against a constant, lagged nominal wages, wholesale prices, unemployment and the change in unemployment. The estimation method used is a GLM with Newey-West HAC standard errors. P-values are reported in brackets under the corresponding values.

Table 9: The estimated wage adjustment equation

			Dependent variable: Industrial production				
			Independent variables				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
constant	price	laggedwage	laggedipi	openimport	spread	unempl	dummy
-2.08	0.318	0.098	0.698	-0,168	0.003	-0.66	0.034
(0.864)	(0.003)	(0.703)	(0.000)	(0.000)	(0.936)	(0.013)	(0.025)

Legend: This regression is a variant of the Bernanke-Carey aggregate supply equation, in which the wage adjustment equation is nested into the output equation (2). Industrial production is thus regressed against a constant, wholesale prices, lagged nominal wages, lagged industrial production, the ratio between imports and world production index, the spread on bond yields, unemployment and a structural break dummy. The estimation method used is a GLM with Newey-West HAC standard errors. P-values are reported in brackets under the corresponding values.

Table 10: The estimated aggregate supply equation

Figure 1: The Italian detrended GDP, IPI and employment index in 1929-1938. Sources: Elaborations on Rossi, Sorgato and Toniolo (1993), Ministero delle Corporazioni, various years and ISTAT, various years.

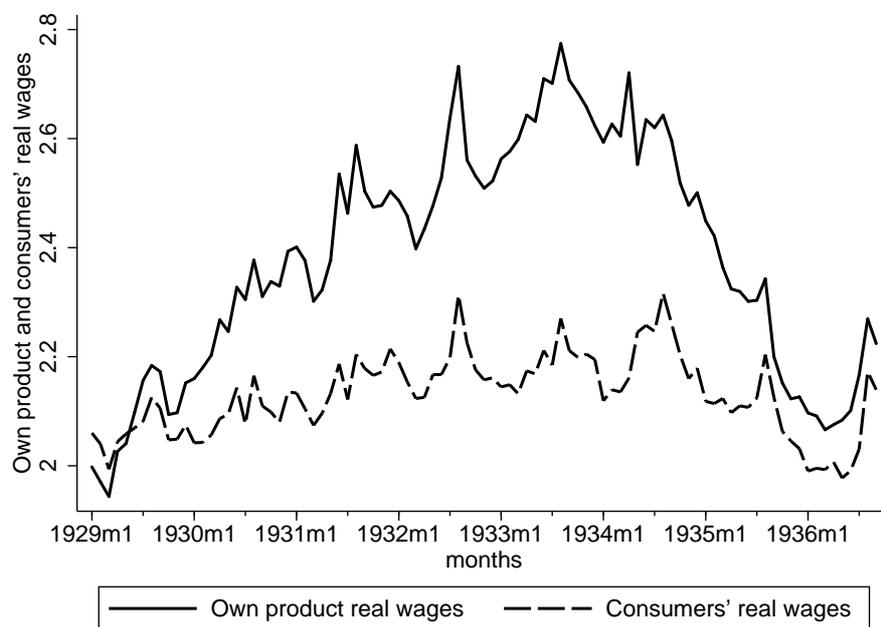Figure 2: Consumer and wholesale prices indices. Source: ISTAT, various years.

Figure 3: The two detrended real wage series. Source: Elaborations on ISTAT, various years and Zamagni (1994).