Has globalisation changed the Phillips curve? Firm-level evidence on the effect of activity on prices

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HAS GLOBALISATION CHANGED THE PHILLIPS CURVE? FIRM-LEVEL EVIDENCE ON THE EFFECT OF ACTIVITY ON PRICES

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Abstract

It has been recently argued that the flattening of the Phillips curve, observed in the main industrial countries over the last two decades, is due to globalisation, which exposes domestic firms to fiercer international competition and severs the link between domestic demand and pricing. A more traditional explanation, with very different policy implications, centres on an increase in the credibility of the monetary regime. Substantial identification problems plague the empirical literature on this issue. We take advantage of a unique dataset including firm-level information on the pricing, capacity utilisation, export orientation, foreign competition, import penetration and delocalisation activity of about 2,000 Italian firms in the period 1988-2005; we test whether the finding of a weaker link between capacity utilisation and prices is confirmed at company level, whether it is robust to controlling for inflation expectations and whether it is concentrated among those firms that are more exposed to globalisation. According to the evidence presented, this is not the case. The conclusion is that the observed flattening of the Phillips curve is not due to globalisation.

JEL Classification: E31; E52; E58.
Keywords: Phillips curve, globalisation, inflation, monetary policy.

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1. Introduction

A widespread flattening of the Phillips curve has taken place in recent years, affecting most industrial countries and raising important policy issues. In virtually all the advanced economies, the response of inflation to a variety of measures of cyclical slack (such as the unemployment gap, the output gap or the degree of capacity utilisation) has steadily decreased since the 1980s. There has been much discussion on how monetary policymakers should react to this finding: does it indicate that there is more room to sustain economy activity without paying the cost in terms of inflation, or is it simply an endogenous sign of monetary policy success? To answer these questions, it is crucial to understand the determinants of the changes in the Phillips curve.

An increasingly influential argument, advanced by Borio and Filardo (2007), as well as by others, draws a link between the flattening of the Phillips curve and the spread of globalisation or, more precisely, the stronger competitive pressures from emerging countries, notably from Asia, unleashed by the increasing openness of the international economy. There are various versions of this story, the common element being that globalisation has changed the price setting behaviour of individual firms. According to this view: foreign competition has reduced the pricing power of domestic corporations, limiting their ability to raise prices during booms in response to transitory domestic cost or demand pressures; the prices of items produced at home are increasingly determined by foreign demand and supply factors, rather than domestic ones; and on the labour market, the threat of outsourcing to cheaper labour countries disciplines wages, keeping them low and less responsive to increases in demand.

This implies that a flatter Phillips curve is a structural feature of advanced economies; if true, this would have far-reaching implications for the conduct of monetary policy. The most obvious is that monetary policy would have more leeway to fine-tune domestic activity, with less need to worry about inflationary risks. More generally, policy responses to domestic cost shocks could be less aggressive and more gradual.

However, forty years of economic analysis provide a warning about the dangers of too hastily treating changes in the Phillips curve as structural. A more traditional line of argument links the flattening of Phillips curves to the very success of monetary policy in

stabilising actual and expected inflation. From this perspective, the observation of a negative correlation between "sacrifice ratios" and the average inflation rate may reflect an endogenous adjustment of the degree of price stickiness to lower inflation, or a change in the way inflation expectations are formed under a more credible policy regime. In this case, treating endogenous and reversible changes of the output-inflation trade-off as if they were structural may lead to recurrent policy mistakes, as shown by Sargent (1999).

Assessing whether the change in the slope of the Phillips curve is structural, or just an endogenous by-product of the success of monetary policy, is therefore extremely relevant. A vast, and quickly expanding, empirical literature addresses this issue. However, the evidence presented is almost entirely based on the estimation of reduced form relationships and on macroeconomic data. The identification problems raised by this approach, which hinge on the difficulty of properly controlling for inflation expectations, are substantial; as a consequence, the results can hardly be conclusive in discriminating between the two broad sets of explanations described above.

The empirical strategy followed in this paper is to exploit microeconomic evidence, making extensive recourse to individual data and exploiting the variability in firm characteristics, first, to better identify the underlying structural relationship and, second, to examine observable implications overlooked by the macroeconomic literature. This paper exploits a unique dataset, including almost twenty years of information on individual firms' pricing and capacity utilisation, as well as on various aspects of their exposure to globalisation, to recover a firm-level supply curve. The availability of firm-level information makes it possible to control for aggregate effects, such as changes in inflation expectations, avoiding the identification problems typical of aggregate estimates of the Phillips curve. It also makes it possible to test for some observable implications of the hypotheses discussed above, as the fact that the change in the sensitivity of prices to capacity utilisation is more pronounced for those firms which are more directly exposed to the competition of emerging countries.

From this perspective, Italy is an ideal case to study. Given its traditional specialization in low and medium technology production, like textiles and clothing, the Italian economy has been particularly affected by increased competition from emerging countries, notably Asian ones. The recent entrance of China into the world market is

significantly affecting Italian producers and spurring debate and controversy in the public domain. At the same time, Italy shares the trend, common to other industrial countries, towards lower and more stable inflation, as well as towards a lower sensitivity of inflation to cyclical swings. Still, a link between the two findings is controversial. In recent decades, there have been some monetary reforms of unprecedented relevance, fostering the anti-inflationary credibility of the monetary authorities, which could well account for the flattening of the Phillips curve. In 1992 full independence in moving the discount rate was granted to the Governor of the Bank of Italy; since 1994 the Governor has explicitly announced annual inflation objectives, while the wage bargaining set-up introduced in 1993 has linked wage increases to the official inflation target;[2] in 1998 Italy joined the Economic and Monetary Union and the Eurosystem adopted price stability as its primary objective.

The paper is organized as follows. Section 2 briefly reviews the recent literature on the link between globalisation and sacrifice ratios. Section 3, after discussing the advantages of making recourse to micro data to address the empirical issues that are still unresolved, presents the empirical model. Section 4 reviews the main macroeconomic stylized facts on sacrifice ratios and globalisation in Italy, then introduces the data, based on the Bank of Italy's *Survey of Investment in Manufacturing*. Section 5 discusses the empirical results and Section 6 draws some final conclusions.

It should be noted that there are other aspects of the debate on the effect of globalisation on inflation that are not addressed in this paper. Notably, there is an intense discussion on whether, in recent years, trade links and international competition have acted as a negative shock to inflation, through falling import prices and increasing imports of inexpensive goods. While extremely relevant, this amounts to a relative price shock and, possibly, a temporary decline in inflation, rather than a permanent change in the output-inflation trade-off; as a consequence, it would have fewer direct implications for the optimal design of monetary policy, although benefits for the consumer may be substantial. A quantitative assessment of the direct effects of trade on inflation is provided by Pain, Koske

[2] There is a description of the announcement of *de facto* inflation objectives in Altissimo, Gaiotti and Locarno (2001, p. 147). On the wage bargaining system introduced in 1993, see Brandolini *et al.* (2007). A major change in the policy regime, which is likely to have contributed to an earlier flattening of the Phillips Curve, had already taken place at the beginning of the 1980s when Italy joined the European Monetary System.

and Sollie (2006) for OECD economies, by Kamin *et al.*(2004) for the US and by Chen, Imbs and Scott (2004) for the EU. The general finding is that these effects, although small, exist. These issues are however not addressed in this paper. [3]

2. Globalisation and the Phillips curve: the literature

There is abundant evidence of the flattening of the Phillips curve in industrial countries. Kohn (2006) reports that the coefficient on the unemployment gap in a reduced form for US consumer inflation has fallen over the past twenty years. The IMF (2005) concludes that in eight advanced economies the sensitivity of inflation to output has decreased since the 1980s. Pain, Koske and Sollie (2006) find that the impact of the domestic output gap on inflation in OECD countries has decreased since 1995.

Borio and Filardo (2007) conjecture that there is a link between the widespread flattening of the Phillips curve observed in industrial countries and the spread of globalisation. Empirically, they find a significant reduction in the effect of the domestic output gap on the deviation of inflation from its trend in 17 economies after 1992. They also present results suggesting that after 1985 a positive response to global output gaps emerged. A similar result is reported in BIS (2006), where the correlation between inflation and global output gaps is shown to have grown constantly over the last decade, roughly at the same time as global economic integration was deepening.

Borio and Filardo advance what has been labelled a "globe-centric" view, arguing that "global slack", rather than domestic slack, is a major driving force of domestic inflation rates. They argue that increased substitutability between domestic and foreign goods, as well as between domestic and foreign labour, has severed the connection between domestic demand pressures and domestic inflation, while, at the same time, strengthening the sensitivity of inflation to supply and demand conditions on world markets.

Some studies share this view. According to Bean (2006a), increased competition from emerging countries may have decreased the scope of a firm to move its prices in response to a cyclical rise in marginal costs, affecting the cyclical behaviour of profit margins.

[3] For Italy, the issue is dealt with in a research by M. Bugamelli, S. Fabiani and E. Sette, 2008 (in progress).

Moreover, marginal costs may also have become less sensitive to the business cycle, as the threat of locating activities offshore in China, India or Eastern Europe diminishes the power of workers to claim higher wages at a time of falling unemployment. From a policy point of view, he concludes that the flattening of the Phillips curve is a mixed blessing, since it implies that policy errors will not show up in large movements of inflation away from the target, but also that variations in aggregate demand are a less effective means of controlling inflation.

However, there is controversy. According to Rogoff (2006), an increase in international competition should in principle steepen, rather than flatten, the Phillips curve: firms revise prices more frequently, as the cost of keeping prices fixed at the wrong level increases.[4] Ball (2006) disagrees with the idea that greater international competition severs the link between prices and domestic capacity, since even in this case firms' marginal costs still depend on the firm's own output levels, rather than global ones, while at the same time no robust reason for an increased counter-cyclicality of mark-ups has been advanced. On the empirical side, he estimates a Phillips curve for the G7 countries over 1971-2005, allowing the output coefficient to depend on trade, and shows that the latter has, at most, a small effect. More importantly, he argues that substantial econometric issues arise, linked to the difficulty of properly specifying empirically an aggregate Phillips curve. Ihrig *et al.* (2007) estimate standard Phillips curves for 11 countries and find no evidence that the decline in the sensitivity of inflation to the domestic output gap is due to globalisation. Woodford (2007) addresses the effects of openness from a theoretical perspective in a two-country new-keynesian model, concluding that even in an open economy the aggregate supply relation connects domestic inflation mostly with domestic economic activity, with little or no role for "global slack", and that, even with a single world market for labour, the trade-off between domestic inflation and domestic output is not necessarily reduced. [5]

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[4] A similar conclusion was reached by Romer (1993) based on a different argument: sacrifice ratios should be smaller (hence Phillips curves steeper) in open economies, since in that case an expansionary monetary policy has larger effects on inflation via the exchange rate, and smaller effects on output, via the higher price of imported intermediate inputs.

[5] Some previous literature on the link between openness and sacrifice ratios also produced mixed results. Temple (2002) found no evidence of a cross-country correlation between the share of imports in GDP and the measures of sacrifice ratios proposed by Ball (1994) and by Ball, Mankiw and Romer (1988). Daniels, Nouzard

The economic literature supplies an alternative explanation of the observed stylized facts, with very different implications. Ball, Mankiw and Romer (1988) have long shown that there is a negative relationship between sacrifice ratios and inflation, which suggests that sacrifice ratios may be endogenous to the policy regime and reflect the latter's effect on inflation expectations. Lower inflation may foster a relatively infrequent nominal price adjustment, which mechanically flattens the Phillips curve; moreover, a solid anchor for inflation expectations decreases the reduced-form response of current inflation to a monetary shock.

Such a flattening of the Phillips curve would be policy-induced and reversible, and could not be exploited for optimal control purposes. A long-standing tradition in economic analysis, since the seminal contributions by Friedman, Phelps and Lucas, emphasizes the pitfalls of treating estimated Phillips curves as structural relationships. Sargent (1999) presents a model showing how "naïve" reduced form estimates of the inflation-output trade-off may induce recurrent policy mistakes, generated by the very success obtained in the past. His hypothesis relates policymakers' determination in contrasting inflation to the evolution of their views on the unemployment-inflation trade-off, and he warns that if their views are driven by simple empirical correlations, disinflations are not bound to last and inflation may periodically occur.

The general conclusion from the literature seems to be that the issue is an extremely important one, but is yet empirically controversial. All in all, the aggregate evidence is of little help: while it shows that the spreading of globalisation and the flattening of the Phillips curve are robust stylised facts, it is mute on how to interpret them, on how they are connected to each other and on any policy implications that can be drawn. More disaggregated information is needed.[6]

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and Vanhhose (2005) found such a relationship by augmenting Temple's regressions with measures of central bank independence. Razin and Lougani (2005) also found a positive effect of openness on the sacrifice ratio when trade intensity is replaced with indexes of institutional barriers to trade.

[6] This is also pointed out by Borio and Filardo (2007).

3. Capacity utilisation and pricing at firm level

The strategy followed in this paper is to look for evidence on the link between capacity utilisation and pricing using firm-level data. This choice has important advantages with respect to aggregate time-series analysis. As the discussion in the previous section shows, from an econometric point of view structural changes in the link between activity and inflation are extremely difficult to identify using aggregate data, since they cannot be completely disentangled from spurious correlations, possibly due to omitted variables. Focusing on individual data offers a large set of instruments to achieve identification: the effects of globalisation are likely to be quite different depending on firms' exposure to international competition, as they operate through firm-specific channels (the cyclical evolution of desired mark-ups, the slope of firm-specific factor supply curves). It is at this level of disaggregation that the investigation could be more fruitfully conducted.

We start from a pricing equation:

$$\Delta p_{i,t} = \Delta l_{i,t} + \Delta \mu_{i,t} \tag{1}$$

where $p_{i,t}$ is the price set by firm i at time t, $l_{i,t}$ stands for marginal labour costs and $\mu_{i,t}$ stands for the mark-up. To derive a firm-level supply function, two standard features are then taken into account: *i)* marginal labour costs are affected by the degree of capacity utilisation; *ii)* adjustments in mark-ups may compensate part of the cyclical movements in marginal costs.

Both topics have been extensively addressed in a vast literature, which cannot be satisfactorily summarised here. Rotemberg and Woodford (1999) review at length the reasons for the pro-cyclicality of marginal costs. These may derive from: the existence of firm-specific upward-sloping labour-supply curves, as workers demand a higher wage to supply extra hours; institutional arrangements, such as overtime premia written into labour contracts; the cyclical behaviour of the cost of keeping inventories, which raises costs during periods of expansion; firm-specific capital which is fixed in the short-term and cannot be disposed of on liquid markets, resulting in decreasing returns (as argued by Altig *et al.*, 2004).

The cyclicality of mark-ups has also been extensively addressed on theoretical grounds and it is much more controversial; nevertheless, it is a key element in the discussion on the effect of foreign competition on domestic pricing. In standard models of imperfect competition, the degree of competition, through the elasticity of demand, determines the level of the mark-up of prices over marginal costs, but it is unrelated to the cyclicality of its movements, as pointed out by Ball (2006). However, there is a large literature on models where mark-ups are endogenous and change over time. Rotemberg and Woodford (1999) survey a wide range of models based on sticky prices and on variable desired mark-ups, as well as on their interaction.[7] We consider here the possibility of an asymmetric reaction of demand to price increases and decreases (a smoothed version of the kinked demand curve), which follows from the idea that the consumer is subject to search costs due to imperfect information on other firms' prices (Ball and Romer, 1990). In this case, the optimal choice for the firm is to have prices react less than on a one-to-one basis to cyclical movements in its own marginal costs.

Globalisation may in principle affect both mechanisms. Increasing labour market competition and the threat of outsourcing jobs induces changes in the way labour costs react to temporary demand pressures at firm level, thus decreasing the slope of the firm-specific labour supply curve. In addition, in the face of increasing international competition, domestic firms operating in customer markets may probably lose more consumers by increasing prices, than they would gain by lowering them; desired mark-ups may then absorb a larger part of the cyclical movements in marginal costs.[8]

These considerations are more formally developed in the Appendix. All in all, taking into account both the slope of the marginal cost curve and the behaviour of mark-ups, the equation to be estimated is derived as follows:

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[7] Models of variable desired mark-ups may be based on variable elasticity of demand, on customer markets (where firms set prices not only to maximise current profits, but to expand their customer base in the future), on implicit collusion, and on variable firm entry.

[8] It should be stressed that the latter is not a necessary conclusion. As Ball and Romer (1990) show, it depends on the assumption that, if prices are unchanged, most buyers prefer to remain with their original sellers.

$$\Delta p_{i,t} = s_i + t_t + a_1 CU_{i,t} + \eta_{i.t} \tag{2}$$

where $CU_{i,t}$ is the degree of capacity utilisation at firm level, which proxies the level of activity, s_i is an individual fixed effect and t_t is a time fixed effect. The coefficient a_1 depends positively on the slope of the marginal cost curve and negatively on the degree to which mark-ups may compensate for marginal cost movements; a structural effect of an increase in globalisation on the output-inflation trade-off is reflected in a change in a_1. Time fixed effects t_t control for inflation expectations, which are assumed equal across agents.[9] Individual fixed effects s_i control, among other things, for a firm-specific steady-state level of capacity utilisation, CU_i*.

Equation (2) can be thought as a firm-level counterpart of the Phillips curve. However, as discussed in more detail in the Appendix, its estimate is not affected by the usual identification problems since it is possible to control for inflation expectations via time fixed effects t_t. Moreover, it is possible to take advantage of the cross-firm variation in price changes to ensure the efficiency of the estimates, even in periods, such as the last decade, when inflation hardly changes.

We first test whether the observed flattening of the macroeconomic Phillips curve can be replicated at the micro level by a corresponding decrease in a_1 in (2). This should not be the case if the increase of the sacrifice ratio observed at the macroeconomic level is only due to the dynamics of inflation expectations. We also test whether the estimated pattern of a_1 is robust to controlling for inflation expectations through t_t .

In addition, the effect of globalisation on the slope of the supply curve is not expected to be the same for all firms. On the mark-up side, it is concentrated among those firms who are exposed to competitive pressures from emerging countries; on the marginal costs side, the possibility of reducing the increase in costs due to capacity pressures is mostly relevant for those firms who outsource production.

We then take the entry of China into the WTO at the beginning of this century as a

[9] As discussed in the Appendix, the idea that t_t mostly accounts for inflation expectations is consistent with the Italian labour market set-up, in which national wage contracts reflect inflation expectations at the time of

natural experiment and verify whether in that occasion the coefficient a_1 decreased more significantly for those firms that were subject to the impact of globalisation, than for the other firms, that can be used as a control group.

For these purposes, we need firm-level information on price changes and on the degree of capacity utilisation. In addition, to choose appropriate sample splits, we need to find measures of the firms' exposure to international competition, focusing on export orientation, on foreign penetration in the domestic market, on the presence of foreign competitors and on the possibility to outsource production.

4. The data

4.1 Italy and globalisation: the macroeconomic facts

During the last four decades, the progressive flattening of the Phillips curve observed in the main industrial countries has also been apparent in Italy. This is shown in Table 1, which reports the results of a regression of inflation on the output gap (measured as the deviation of GDP at constant prices from its HP-filtered trend) and its own lags. The effect of a change in the output gap on inflation was much greater in the 1970s, and has constantly decreased since then. According to the estimates shown in the last row of Table 1, in 1998-2006 a one per cent increase in the output gap caused inflation to increase by an almost negligible amount, only about 0.1 percentage points after three quarters; the same effect was double this large in the previous decade, and more than ten times larger in the 1970s.[10]

To verify the existence of a structural break, we applied a sup-Chow test, by running a sequence of Chow tests with varying break dates and comparing the highest statistics with the critical values reported by Andrews (1993).[11] Figure 1 reports the results when the estimation covers the last two decades, a period which is useful for a better comparison with

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the contract (included in t_t), while productivity gains and real wage increases are largely left to firm-level agreements (hence the reaction of labour costs to capacity utilisation is largely a firm-level phenomenon).

[10] The decrease in the effect of activity on inflation is due both to a decrease in the impact of the gap on inflation between the 1970s and the 1990s, and to a decrease in inflation persistence after 1999.

[11] When the break date is not known a priori, the standard distribution of the Chow test statistics cannot be used.

the time horizon of our micro data sample, as discussed below. The results clearly reject the null hypothesis of coefficient stability, identifying a break point in 1995.[12]

Assessing whether an increase in globalisation took place is less straightforward, as it heavily depends on the way the latter is defined, which is not uncontroversial.[13] If globalisation is considered as tantamount to openness, no clear trend emerges: the degree of trade openness of the Italian economy was not markedly different in 2005 compared with the beginning of the 1980s (Fig. 2). In contrast, the change in the composition of trade since the beginning of this century is startling. The share of China and India in Italian trade has increased four-fold since 2000 and it is still on the rise (Fig. 3). The penetration of Chinese products into Italian markets, although gradually increasing over time, was largely fostered by a specific event, China's joining the WTO (November 11, 2001).

The effects on Italian business were significant. Italian industry is specialised in medium-to-low technology sectors (textiles and clothing, leather and footwear), that are particularly vulnerable to competition from newly industrialised countries.[14] Following China's membership of the WTO, imports of textile and clothing from China to Italy grew substantially, while, at the same time, Italian exports of textile and clothing towards third countries decreased, reflecting more competition from Asian producers on those markets. Italian firms operating in these traditional sectors also increasingly delocalized various stages of production towards countries with lower labour costs, such as emerging European countries, China and India.[15]

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[12] When a longer sample is considered, another break point is identified at the beginning of the 1980s.

[13] In the economic literature, globalization is defined either as equivalent to openness (Frankel, 2006) or more narrowly as the integration into the world economy of emerging countries, notably China and India, which have strong competitive advantages in some sectors (Bean, 2006). It is sometimes seen to start in the mid-1980s; in other cases, the focus is on the end of the 1990s, when the expansion of the above-mentioned economies accelerated.

[14] In 2000-2001 only 13 per cent of Italian exports was in high-tech sectors, while 44 per cent was in low-tech sectors, mostly textile and clothing; the same figures for the euro area were 30 per cent and 21 per cent (ECB, 2005).

[15] On the behaviour of Italian exports after China joined the WTO, see Banca d'Italia (2005). On delocalisation, see Banca d'Italia, 2006, p. 156.

4.2 The SIM dataset

We use data from the Bank of Italy's annual *Survey of Investment in Manufacturing* (SIM).[16] The SIM contains specific information on individual Italian manufacturing firms since 1978; during the last two decades, the survey has been extensively used to investigate a large number of topics.[17] Data are collected at the beginning of each year by interviewing a stratified sample[18] of firms with more than 50 employees (smaller firms have only been included since 2003). The survey includes information on the corporate structure of the firm, employment, investment, production and technical capacity, as well as on specific topics that change year by year. Data revision is carried out by officials of the Bank of Italy. A special effort is made to keep information as closely comparable as possible in subsequent years.

A major advantage of SIM is that it contains information on a number of variables that are not usually available. Since 1988, firms have been asked to report the percentage change in the average price of goods sold. Figure 4 shows the distribution of this variable. The average annual price change is around 2 percent; there is quite a high degree of variability, both over time and across firms. The distribution is more or less symmetrical around its mean value (implying no downward rigidities of producer prices). The share of firms that change their prices each year is on average around 80 per cent; this value is in line with research on price stickiness in Italy, which found that firms change prices on average every 10-11 months.

The price information in the SIM sample accurately represents the whole economy. The annual sample mean of individual price changes is closely correlated with its macroeconomic counterpart, PPI inflation, with a correlation coefficient of around 0.85, and tracks its movements well, as shown in Fig. 5.

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[16] Services firms were only recently included in the survey, which is currently known as *Survey of Industrial and Services Firms*. See http://www.bancaditalia.it/statistiche/indcamp/indimpser .

[17] Full references can be found in Gaiotti and Secchi (2006). Recently, Bugamelli (2007) used SIM price data to assess the effect of product quality and firm characteristics on export prices.

[18] The sample is stratified according to three criteria: sector, size and geographical location. With regard to the first criteria the two digits classification of the National Institute of Statistics (ISTAT) is adopted. Size is proxied by the number of employees. Location is indicated by region.

The firm-level rate of capacity utilization is also available in SIM, as the answer to a specific question, which is reported in the sample every year: "what is the ratio between actual production and the level of production which would be possible by fully using the available capital goods and without changing labour inputs?". Firms on average report that they are using 80 per cent of their capacity; the dispersion of this variable is relatively high, ranging from 100 per cent to 40 per cent, with a few observations below this value (Fig. 6).

The movements in the degree of capacity utilisation in SIM also track the corresponding behaviour of the output gap in the whole economy quite well (Fig. 7). The annual sample mean of capacity utilisation is correlated very closely with the economy-wide index of capacity utilisation[19] (the correlation coefficient is 0.85) and is also fairly well correlated with the output gap (the correlation coefficient is 0.53).

As mentioned, in equation (2) we treat capacity utilisation as a proxy for the movements in firm-level marginal costs, which are not separately considered in the equation. This is for two reasons: firstly, and more importantly, our main interest lies in the final effect of changes in capacity on prices, which can be directly compared to the aggregate Phillips curve. Secondly, reconstructing information on marginal costs is quite problematic; even concentrating on average costs, they are more noisy than for the index of capacity utilisation and often do not cover the whole period.

Key to this approach is the assumption that our measure of capacity utilisation is a determinant of firms' marginal costs. Some partial evidence supporting this can be found by relating unit costs to our measure of capacity utilisation. Table 2 presents simple regressions which relate various measures of the change in costs at firm level to capacity utilisation.[20] The results show that a 10-point increase in capacity utilisation (i.e. the median absolute change in our sample) determines an increase in labour compensation per capita of about 1 per cent, an increase in total costs per unit of output of about 2 per cent, and a greater recourse to overtime hours of about 0.1 per cent of total hours.

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[19] This is an index based on industrial production and quarterly surveys by ISAE.

[20] To proxy for costs, we consider the increase in compensation per person, obtained from firms' balance sheets available for 1989-2004; the increase in total costs (labour and material inputs) per unit of output, also derived from balance sheet data; the ratio of overtime hours to total hours, available in SIM since 1999.

Our complete sample, obtained by dropping all the data points for which information on either price changes or capacity utilisation is missing, covers the period 1988–2005; it includes 18,943 observations and between 800 and 1600 firms per year (Table 3). Table 3 also reports the composition by firm size and by industry; as shown by Gaiotti and Secchi (2006) the sample is fairly representative of the population of Italian firms, the only exception being that it is slightly biased towards larger firms. The main statistics on the two main variables are reported in the first two rows of Table 4.

4.3 Firms and globalisation in SIM

The survey also includes disparate information on firm characteristics which makes it possible to assess their different exposure to globalisation.

The first piece of information is *the share of firms' sales that are exported*. Exporters are exposed to increasing foreign competition on their external markets; as a consequence, they may be more prone to compensate cyclical movements in marginal costs through mark-ups to defend future market shares. As shown in the third row of Table 4, on average a firm in the sample exports 33 per cent of its sales; however, around 25 per cent of respondents have an export/sales ratio larger than 50 per cent, while about 22 per cent of respondents do not export at all. Over time, the average propensity to export increased between 1993 and 1996,[21] then it stayed approximately stable, on a slightly decreasing trend (fig. 8).

A second piece of information is *the (three-digit) sector of the firm,* which can be matched with other sources of information on the *importance of imports from Asia* in that sector. This classification, in contrast with the previous one, is designed to assess the degree of foreign competition faced by Italian firms in their domestic market. The sector that is most exposed to Asian competition can be identified by looking at the share of Asian products among foreign imports in that sector, based on the *World Trade Analyzer* of Statistics Canada.[22] Table 5 shows the share of imports from Asia in relation to total Italian

[21] This is likely to be an effect of the depreciation of the lira after its exit from the EMS exchange rate mechanism in 1992.

[22] I am grateful to Matteo Bugamelli, Silvia Fabiani and Enrico Sette, who kindly provided me with their series based on WTA data.

imports for each (three-digit) sector in 2003. In the sample, the average ratio of Asian to total imports is 11 per cent, ranging from a maximum of almost 60 per cent to a minimum of zero, as also shown in the fourth row of Table 4.[23] It is highest in sectors such as toys, textiles and sporting goods, and lowest in sectors such as drinks, milk and food. This feature is largely unrelated to the previous one; the coefficient of correlation of these two characteristics across firms is only 4 per cent.

Other firm characteristics can be observed, by examining the answers to occasional questions that appeared in some particular year. In the 2003 survey, there was a section assessing *the kind of foreign competition firms were exposed to*. In particular, there were questions on the average quality of the firm's own products and of its competitors' products, distinguishing between industrialised countries, other countries, and among the latter, China (Table 6).[24] We consider as "firms exposed to foreign competition" those that in 2003 answered the question on the quality of their competitors' products, with replies other than "do not know" or "not applicable"; we assume this feature did not change through the whole sample period. According to this definition, about 65 per cent of respondents had competitors from industrialised countries, and around 30 per cent had competitors from China in that year.[25]

Questions on *the delocalisation of productive activity* were also included in the SIM in 2003 and in 2004. This classification is important since, according to the interpretations of the effects of globalisation discussed in Section 2, workers in companies that are delocalising production may make less aggressive demands for increased overtime compensation or production premia when activity rises. In 2004, 14 per cent of firms declared that "they produced goods or services abroad using subsidiaries or controlled companies"; in addition, 13 per cent declared that they had commercial deals with foreign firms and 8 per cent said that they had production agreements with foreign firms (Table 7). The survey also asked about the timing of delocalisation. Among the respondents who outsourced part of their

[23] For a few industries, information at the three-digit level was not available, reducing available observations for this variable from about 19,000 to around 16,000.

[24] Possible answers were "cheap, good price/quality ratio, medium quality, high quality, don't know, not applicable."

[25] In the whole panel, these firms represent 22 per cent and 14 per cent of total observations, respectively.

production, 50 per cent did so after 1999; almost 40 per cent between 1990 and 1998; only 7 per cent in the 1980s and 4 per cent in the 1960s or in the 1970s.

We split the sample according to five alternative definitions of firms exposed to foreign competition: the *exporters*, those firms whose export/sales ratio is larger than 0.5; the firms operating in sectors with *a high share of imports from Asia*, i.e. those above the upper quartile of the distribution according to the import penetration of Asian countries in their sector; the firms who *acknowledge having Chinese competitors*, i.e. those that gave answers other than "don't know" or "not applicable" to the 2003 question concerning the product quality of their Chinese competitors; the firms who *acknowledge having foreign competitors* (see the previous definition, but the answer concerns all foreign competitors); and the *delocalising* firms, i.e. the ones that in 2004 declared that they produced goods and services abroad through subsidiaries or controlled companies.

Each of these groups represents about one fourth of total observations, except the last two, that respectively account for 40 per cent and 9 per cent (Table 8). The different groups are not independent from one another, but there is no perfect overlapping, ensuring that a separate investigation for each of them is warranted. For instance, about 17 per cent observations refer to firms that, although they are not export-oriented, operate in a domestic sector where the penetration of Asian competitors is large; 25 per cent of total observations refer to firms that did not delocalise production, but are large exporters.

5. Main findings

5.1 Capacity utilisation and prices

The estimate of equation (2) are reported in the first column of Table 9. The coefficient on capacity utilisation is positive, around 0.03, and statistically significant; the results are consistent with those in Gaiotti and Secchi (2006) who find a positive effect of capacity utilisation on prices at firm level.

The magnitude of the coefficient can be compared with the macroeconomic estimate of the effect of the output gap on inflation reported in Table 1, once the different metrics of capacity utilisation and the output gap has been taken into account. Since it turns out that a

change in the output gap of 1 percentage point corresponds to a change in the sample mean capacity utilisation in SIM of about 2.5-3.0 percentage points, our estimate of a_1 corresponds to an effect of the output gap on prices of about 0.08-0.09 within a year (i.e., with an average lag of two quarters). This compares to the effect of about 0.1 and 0.2 after three quarters, reported in Table 1 above.[26] All in all, our figure is broadly consistent with the macro estimate.

In the first column of Table 9, time fixed effects control for aggregate variables, including inflation expectations embodied in contractual wages, as well as other input prices. In order to shed some more light on how SIM price data are related to these aggregate determinants, in the second column of the table, time fixed effects are dropped, so that the change in nationwide contractual wages and the change in input costs can be included as explanatory variables; it is shown they affect prices with the expected sign,[27] while the coefficient on capacity utilisation is not significantly affected. In all the following, we keep the specification in the first column of the table as a benchmark, since it ensures consistent estimates for a_1 by controlling for all possible aggregate variables.

The potential endogeneity of $CU_{i,t}$ in equation (2) also needs to be addressed. To ensure consistency of the estimates, movements in capacity utilisation on the right-hand side have to be driven by demand shocks and be uncorrelated with the pricing (supply) shock $\eta_{i,t}$. Such an assumption looks plausible: assuming that potential capacity is set at its optimal level, movements in capacity utilisation only depend on demand. To test this, we need to find instruments for $CU_{i,t}$, that are unrelated to the pricing shock $\eta_{i,t}$. To this end, we use lagged values of capacity utilisation, as well as a measure of exogenous shocks to demand, which we obtain by exploiting a question regularly included in the SIM, asking whether planned investment was modified as a result of an unexpected increase or fall in demand. We constructed a dummy taking value 1 in the case of an increase, -1 in the case of a decrease, zero otherwise.[28] The IV estimates are very similar to those obtained without instrumenting;

[26] See the last two columns of Table 1 which refer to the same sample period as in the SIM dataset.

[27] The magnitude of the effect is slightly lower than expected, as the sum of the coefficients is not equal to 1. A similar result is found by Gaiotti and Secchi (2006).

[28] More specifically, we used two pieces of information in the SIM: whether the firm judged that the deviation between actual and previously planned investment was due to unexpected demand behaviour (which

a Hausman test overwhelmingly fails to reject the null that the FE estimator is consistent and efficient.

The next step is to test for a possible structural break. We first investigate the existence of a break with an unknown date; to this end, we once more apply a sup-Chow test, running a sequence of Chow tests for all possible break dates and we compare the largest statistics with the critical values provided by Andrews (1993). Figure 9 presents the sequence of Chow statistics (continuous line) and the critical value for a 5 per cent confidence level. The null hypothesis (no structural break) cannot be rejected, as the maximum Chow statistics is substantially below the critical value.[29]

As a further check, we report both rolling and recursive estimates of a_1. Rolling estimates are performed by running a series of regressions on panels covering a five-year span, starting with the period 1988-1992 and then moving the window forward. Recursive estimates are based on an initial sample covering the years 1988-1990, then the end date is moved forward one year at a time. The results are shown in Figures 10 and 11, together with 95 per cent confidence bands. While the estimated coefficients decrease in the first few years, they then remain within the previous periods' confidence bands.

The result is confirmed if, as an alternative, a fixed break date is set a priori. Based on the discussion in Section 4.1, the year 2001, when China joined the WTO, is a good candidate date. We also try break dates immediately before or after that year, on the assumption that firms may either have frontloaded their adjustments, to position themselves in view of the expectations of an imminent lifting of tariffs, or alternatively they reacted with some delay.

We estimate the equation:

$$\Delta p_{i,t} = s_i + t_t + a_1 CU_{i,t} + a_2 \; DGlob_t \; CU_{i,t} + \eta_{i.t} \tag{3}$$

provided a dummy taking values 0 and 1) and the quantitative difference between actual and previously planned investment (which was used to sign the previous dummy).

[29] The same applies if a (more efficient, although possibly biased) random-effect estimator is used in place of the fixed effect estimator.

where, $DGlob_t$ is a dummy taking value 1 after 2001, zero otherwise. If China's membership of the WTO affected the slope of supply curves, we expect a negative value for the coefficient a_2 on the interaction term.

The estimates are reported in Table 10. The point estimate of coefficient a_2 is indeed negative, but it is never significantly different from zero at the 1 or 5 per cent level. Only in one case is it significantly negative at the 10 per cent level. All in all, results on the existence of a break in the supply curve at the individual level are, at best, inconclusive, although the sign of the coefficient is not inconsistent with the macro findings.

To allow for the idea that the spreading of globalisation may be a gradual process, rather than a discrete event, in a regression reported in the last column of Table 10 we substitute the dummy $DGlob_t$ with a continuous variable, which we label $DChinashare_t$, which measures the share of trade towards China and India over total trade. [30] As shown in Fig. 2 above, this variable is roughly constant until 2000 (with a one-off increase in 1994), then it steadily increases. This implies that the pressure from globalisation started somewhat earlier, with a first increase around 1995, but has mostly gained strength since 2001, with a continuous reinforcement in the following years. The previous conclusions are confirmed: the sign of the coefficient a_2 is negative as expected, but the estimate is far from being statistically different from zero.

How can these results be reconciled with the macro evidence presented earlier, which pointed to a significant break in the Phillips curve equation around 1995? The most obvious conclusion is that the flattening of the Phillips curve is linked to the evolution of inflation expectations, rather than being otherwise rooted in micro behaviour. Empirically, this is confirmed by our next experiment: we re-run the sequence of Chow tests reported above by omitting the time dummies t_t from equation (3). We now find a significant break-point around 1995, shown by the dotted line in Figure 9, which closely resembles the result obtained for the aggregate time series. It should be recalled that omitting t_t amounts to omitting controls for inflation expectations, and that 1995 marks the moment of an important change in the monetary regime, which is likely to have significantly affected expectations: as

mentioned, in the summer of the previous year, the governor of the Bank of Italy started announcing explicit inflation objectives, a practice that was continued until the ECB was founded in 1998.

All in all, these results suggest that an increase in monetary credibility is likely to be the crucial element in driving the flattening of the Phillips curve, and that only by disregarding the importance of inflation expectations can the macro results be replicated.

5.2 Exposure to globalisation and price adjustment

The mild – and not statistically significant - decrease in the a_1 coefficient found in the previous section may hide a larger effect for the subset of firms exposed to foreign competition; such a result could still be consistent with the assumption that globalisation was the driving force behind the flattening of the Phillips curve. We then turn to our next test. We check whether after 2001 the response of prices to activity has become more muted for firms exposed to foreign competition.

We estimate:

$$\Delta p_{i,t} = s_i + t_t + (a_1 + a_2\ DGlob_t + a_3\ DGroup_i + a_4\ DGroup_i DGlob_t)\ CU_{i,t} + \\ + a_5\ DGroup_i DGlob_t + \eta_{i.t} \tag{4}$$

where $DGroup_i$ is a dummy taking value 1 if the firm belongs to a particular group exposed to globalisation (one of those defined in Section 4.3), while the other variables are defined as before. Coefficients a_1 and a_2 have the same interpretation as before. On the assumption that the acceleration of globalisation after 2001 fostered a decrease in the sensitivity of prices to the level of activity for firms for which $DGroup_i=1$, we expect the coefficient a_4 to be negative. More generally, if the relationship between exposure to foreign competition and the output sensitivity of prices holds, we also expect a_3 to be negative.

[30] Ball (2006) interacts the Phillips curve slope coefficient with a measure of trade in a panel regression including the G7 countries.

The last variable in the equation, the interaction of the $DGroup_i$ and $DGlob_t$ dummies, is needed as a control,[31] and the coefficient a_5 has no strict economic interpretation. However, a negative value is to be expected, on the assumption that the spreading of globalisation and trade acted as a negative shock on the prices of some domestic goods, as discussed among others in Kamin *et al.* (2004) and Chen, Imbs and Scott (2004).

Estimates of equation (4) for each of the groups are reported in Table 11. The results for the coefficients a_1 and a_2 are the same as in the previous sections. The estimate of a_1 is positive and significantly different from zero; the estimate of a_2 is negative, indicating a decrease in the coefficient on $CU_{i,t}$ after 2001, but it is not statistically significant, or only marginally so (at the 10 per cent level). The sign of a_3 varies depending on the specification and is usually not statistically significant.

The main test of our hypothesis is given by the estimate of the coefficient a_4. The null hypothesis that $a_4=0$ (no effects China's joining the WTO on the sensitivity of prices to activity) can never be rejected. Not only is the estimated coefficient never significantly different from zero: its point estimate does not have the expected sign, being positive in most cases. If anything, the prices of firms exposed to globalisation seem to have become more, not less, reactive to their capacity constraints.

As already discussed in the previous section, considering the opening to China as a single event taking place in the year 2001 as a result of WTO membership may be too strong an assumption. The effects of this event on Italian trade may have been slightly delayed or anticipated, or could be seen as a part of a gradual process rather than as a turning point.

As in the previous section, we perform two types of robustness checks. In a first set of experiments, we re-run the preceding regression substituting the variable $DGlob_t$ with its lead or lags. The results for $DGlob_{t-1}$ and $DGlob_{t+1}$ are reported in tables 12 and 13. They are almost identical to those in the previous case; the estimated coefficient a_1 is always negative and strongly significant, confirming a strong effect of capacity on prices, while coefficient a_4

[31] In an alternative specification, not reported, we omitted this variable and interacted all the time dummies with $DGlob_t$. The overall results were robust to this choice.

is never significantly different from zero. The implication is that a mistaken timing of our globalisation variable is not the source of our failure to associate it with significant effects.

As a second robustness check, we allow, as we did in Section 5.1, for the opening to Asian players to take place as a continuous process, replacing the variable $DGlob_t$ with $DChinashare_t$. The results are reported in Table 13. Again, they do not substantially differ from those presented so far.

It is worth adding a final comment on the estimate of coefficient a_5 . In Tables 10 to 13, in those cases when $DGroup_t$ alternatively identifies exporters, firms in sectors where the Asian presence is significant or firms who face Chinese competitors, the estimate is always negative, between -0.3 and -2. This implies that, after globalisation took hold, these types of firms increased their prices by less than those in the control group. Such a result may be consistent with the interpretation of globalisation as a one-off negative shock to the prices of some goods, and empirically in line with the conclusion by Chen, Imbs and Scott (2004) for the EU countries, i.e. that this increased openness exterted a negative and significant impact on EU manufacturing sectoral prices. However, the confidence interval is too wide to come to any firm conclusion on this point, which requires a more specific analysis.

6. Conclusions

It has been conjectured that the flattening of the Phillips curve observed at the macroeconomic level is a structural feature of advanced economies and that it is a consequence of globalisation. The most compelling arguments rely either on a change in the behaviour of individual firms' mark-ups, which may have become more counter-cyclical in order to defend market shares, or on a less upward-sloping curve for firm-specific inputs: companies that are delocalising production may exploit a pool of labour more elastically supplied, and their workers may make less aggressive demands for increased overtime compensation when the level of activity rises.

We argued that a testable implication of this conjecture is that a change in the sensitivity of prices to capacity utilisation is apparent not only in macroeconomic time series, but also at firm level; that this result is robust to controls for economy-wide inflation

expectations; and that such a change has also been concentrated among the firms that are most exposed to international competition.

Using the micro data from the Bank of Italy's *Survey of Investment in Manufacturing* we are able to test whether these implications are observable. The answer is inconclusive at best in the first case and negative in the second and the third. The reduction in the sensitivity of individual pricing to capacity pressures at firm level is not statistically significant. The flattening of the Phillips curve observed at the macro level can only be replicated at the micro level by running a mis-specified regression which omits controlling for inflation expectations through time fixed effects. As for particular groups of firms, the effect on firms that are most exposed to competition (firms that are export-oriented, operating in domestic sectors with a large penetration of Chinese imports, or that moved part of their productive activity abroad), was, if any, of the opposite sign to the one that we expected.

The results suggest that the flattening of the Phillips curve is not rooted in the different behaviour of individual firms exposed to competition, but rather in a more moderate dynamic of inflation expectations. The timing suggests that institutional and policy changes in the first half of the 1990s remain the most likely explanation for the recent flattening of the Phillips curve in Italy. Hence, monetary policymakers would be ill-advised to reconsider their current strategy in light of such evidence.

While we find no support for the conjecture that globalisation affected the Phillips curve, our results do not imply that it had no effect on firms' pricing. These results are consistent with the argument that trade is likely to have acted as a favourable direct shock on the prices of the firms that were most exposed to international competition, possibly with substantial benefits for the consumers. A thorough assessment of this issue is beyond the scope of this paper, but some evidence for this has been supplied by various pieces of empirical analysis conducted for OECD countries.

Appendix: a simple model

For firm *i*, the change in prices is defined as:

(A1) $\Delta p_{i,t} = \Delta mc_{i,t} + \Delta \mu_{i,t}$

where $mc_{i,t}$ stands for the nominal marginal labour cost and $\mu_{i,t}$ stands for the mark-up. All variables are in logs. Suffix *i* indicates the firm, suffix *t* the time period (a year).[32]

The change in marginal labour cost is equal to the change in wage (in turn defined as the sum of the national contractual wage w_t^C and a firm-specific component $w_{i,t}^F$), less the change in labour productivity $prod_{i,t}$:

(A2) $\Delta mc_{i,t} = \Delta w_t^C + \Delta w_{i,t}^F - \Delta prod_{i,t}$

On the Italian labour market, national wage agreements have a two-year duration and are supposed to safeguard purchasing power; more specifically, national wage contracts are almost entirely based on the official forecast for inflation over the contract period, at the time the contract was signed. In contrast, productivity gains, real wage increases and other possible measures affecting the real labour cost are largely left to firm-level agreements. We express national contractual wages as a function of expected inflation at the time the contract was signed, plus a disturbance ε_t:[33]

(A3) $\Delta w_t^C = \pi_{t|t-1} + \varepsilon_t$

The firm faces a firm-specific supply curve for labour, which implies that the growth in the firm-level wage component is a positive function of the deviation of firm-level capacity utilisation $CU_{i,t}$ from its steady-state level, plus a disturbance $\nu'_{i,t}$: $\Delta w_{i,t}^F = \alpha(CU_{i,t} - CU_i^*) + \nu'_{i,t}$. The underlying assumption, consistent with the above-mentioned labour market set-up, is that the response of labour cost to cyclical movements of activity takes place at firm level, reflecting overtime compensation schemes or a greater recourse to seasonal labour. Capital is firm-specific and fixed in the short-run, which implies that labour

[32] It is assumed that all prices adjust within a year.

productivity decreases with capacity utilisation: $\Delta prod_{i,t} = -\beta(CU_{i,t} - CU_i^*) + \nu''_{i,t}$. As a consequence, the growth in the firm-specific labour cost component is a positive function of capacity utilisation.

(A4) $$\Delta(w_{i,t}^F - prod_{i,t}) = \gamma(CU_{i,t} - CU_i^*) + \nu_{i,t}$$

where $\gamma = \alpha + \beta$ and $v_{i,t} = v'_{i,t} - v''_{i,t}$.

Acquiring information on other firms' prices is costly for the consumer. As a result, the firm loses more customers by raising prices than it gains by lowering them, resulting in an asymmetry in the demand curve (Ball and Romer, 1990): demand elasticity, or equivalently the desired mark-up, is a function of the firm's relative price: $\mu_{i,t} = \mu_i - k(p_{i,t} - p_{t|t-1}) + \tau_{i,t}$. As a consequence, changes in mark-ups absorb some of the cyclical movements in nominal marginal costs (prices are stickier in the face of cyclical marginal cost movements):

(A5) $$\Delta\mu_{i,t} = -\theta\Delta(w_{i,t}^F - prod_{i,t} + \varepsilon_t) + \varphi_{i.t}$$

where $\theta = k/1+k$ and $\varphi_{i,t}$ is a disturbance.

The individual firm's pricing equation is then:

(A6) $$\Delta p_{i,t} = \pi_{t|t-1} + \gamma(1-\theta)(CU_{i,t} - CU_i^*) + (1-\theta)(\nu_{i,t} + \varepsilon_t) + \varphi_{i,t}$$

Averaging over firms, the standard aggregate Phillips curve is obtained:

(A7) $$\pi_t = \pi_{t|t-1} + \gamma(1-\theta)\ (CU_t - CU^*) + \chi_t$$

where $\frac{1}{n}\sum_{i=1}^{n}\Delta p_{i,t} \equiv \pi_t$, $\frac{1}{n}\sum_{i=1}^{n} CU_{i,t} \equiv CU_t$.

The "globalisation and the Phillips curve" hypothesis implies that, as an effect of delocalisation, the slope of firm-specific labour supply curves, α, decreases, hence γ decreases, since firms are able to outsource production in times of increasing demand. In

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[33] For the sake of simplicity we only consider one lag.

addition, it implies that firms face new foreign competitors and risk losing their customers if they increase prices; the elasticity of demand to upward price movements increases, more than the elasticity to downward price movements, and k and θ increase.[34] As a result, $\gamma(1-\theta)$ decreases, which is the conjecture we want to test.

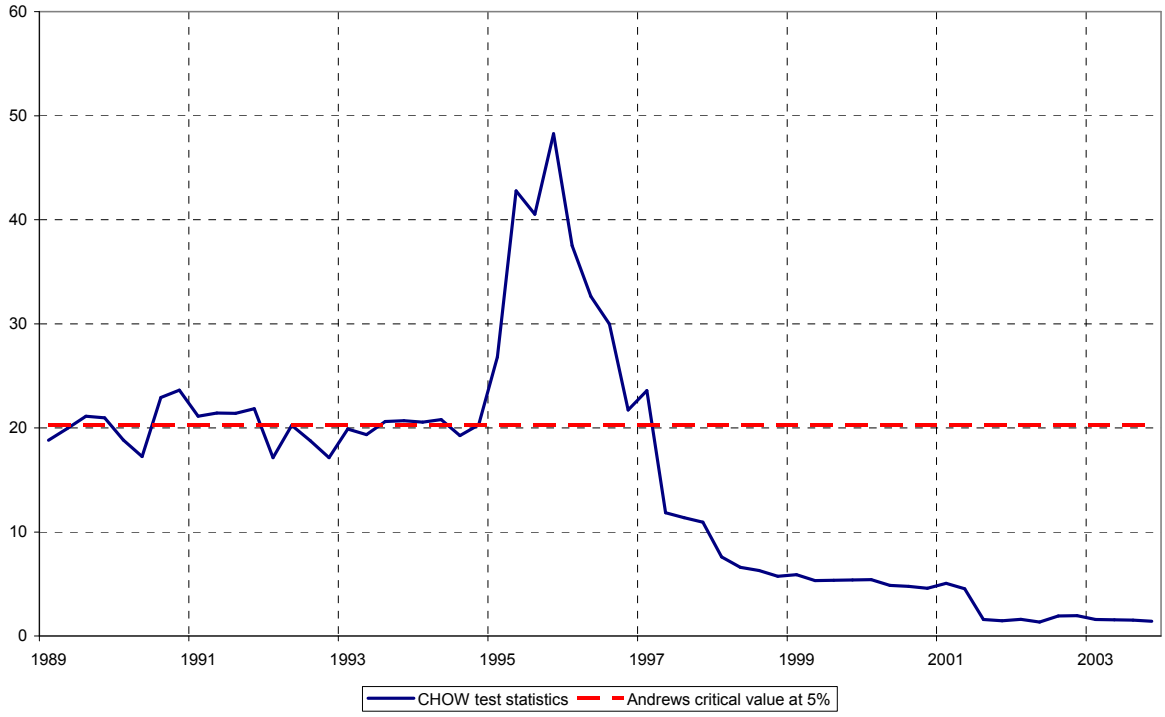
Equation (A7) illustrates that regressing π_t on its own lags and CU_t, as is usually done when using aggregate time series, does not yield consistent estimates of $\gamma(1-\theta)$, because of the omitted variable $\pi_{t|t-1}$, whose correlation with activity may change under different policy regimes. In addition, the very success in stabilising inflation makes (A7) very hard to estimate efficiently, due to the low variance in the dependent variable π_t.

In contrast, (A6) can be consistently estimated with individual data. Using individual fixed effects s_i to control for CU_i* and time fixed effects to control for ε_t and $\pi_{t|t-1}$, expression (2) in the text is obtained and the parameter $\gamma(1-\theta)$ can be consistently estimated. In addition, all the cross-section variability in firms' relative prices can be exploited to efficiently perform the estimate.

[34] As mentioned in the text, the latter conclusion requires the assumption that, at unchanged prices, on average consumers remain with their current supplier (Ball and Romer, 1990).

Tables and figures

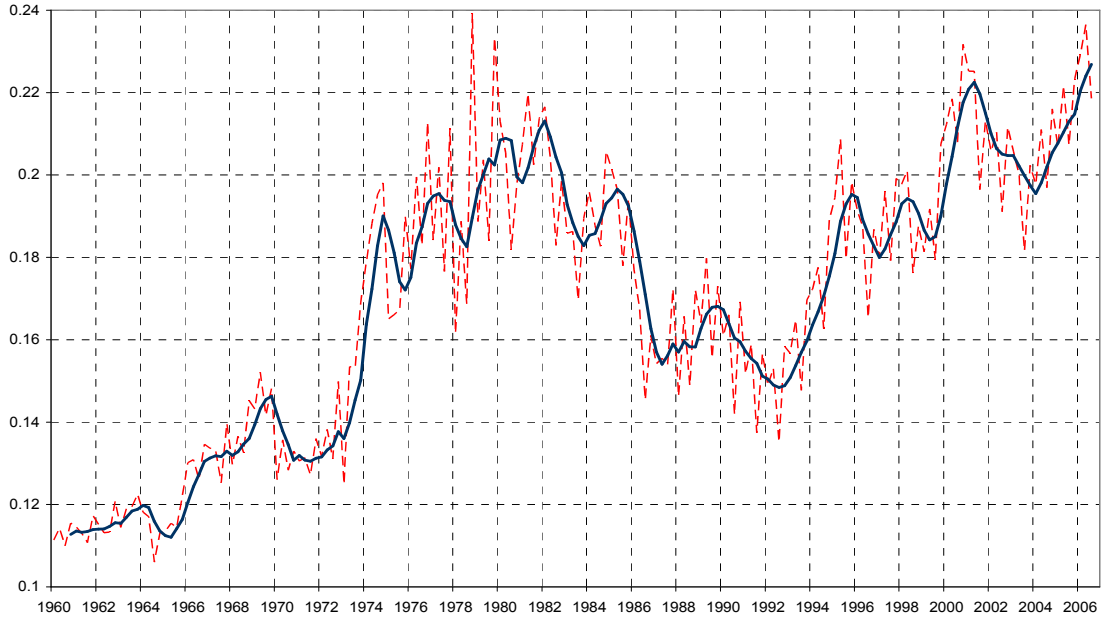
FIGURE 1
SEQUENCE OF CHOW TESTS ON THE MACRO PHILLIPS CURVE



Sequential Chow test χ^2 statistics based on the equation reported in Table 1. Estimation period: 1986-2006. Break-date reported on the horizontal axis, χ^2-statistics reported on vertical axis. The asymptotic critical value is from Andrews (1993), Table I (with parameter π_0=.15 and degrees of freedom p=6).

FIGURE 2

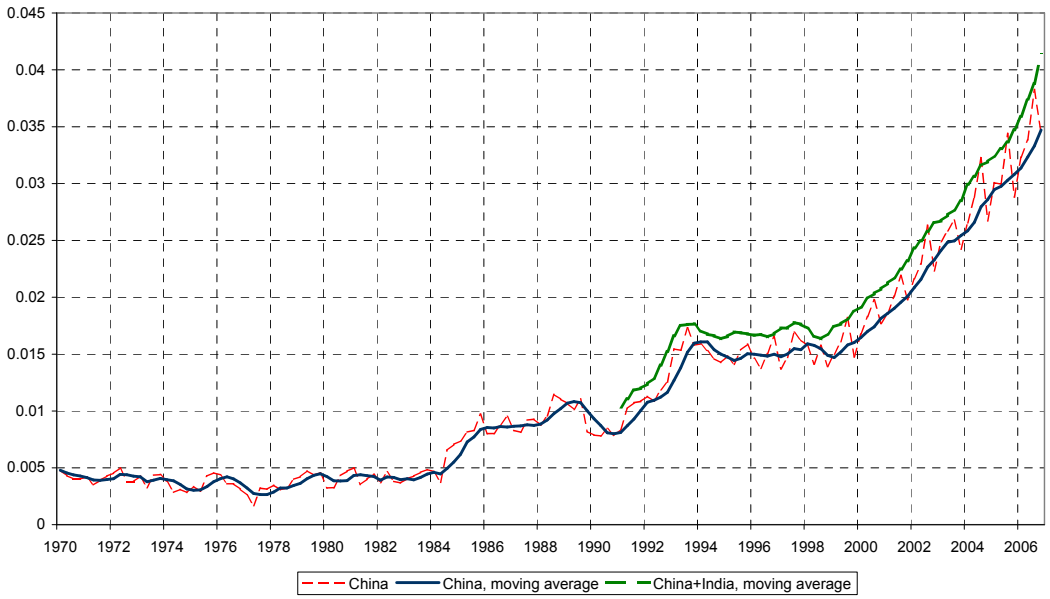
ITALY'S TRADE OPENNESS



Ratio of imports and exports to GDP. Continuous line: 4 quarter moving average. Source: Istat.

FIGURE 3

SHARE OF ITALY'S TRADE TOWARD CHINA AND INDIA



Sum of Italian import and exports vis-à-vis China and India over sum of Italian import and exports. Continuous line and long-dashed line: 4 quarter moving average. Source: Istat.

FIGURE 4

DISTRIBUTION OF PRICE CHANGES IN THE "SIM" SAMPLE

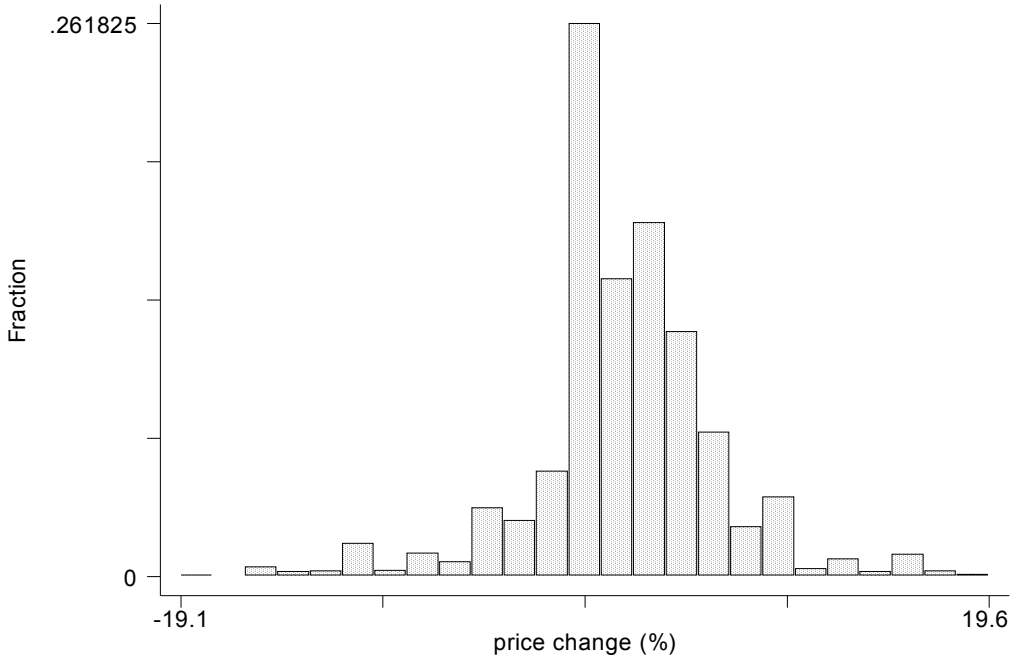
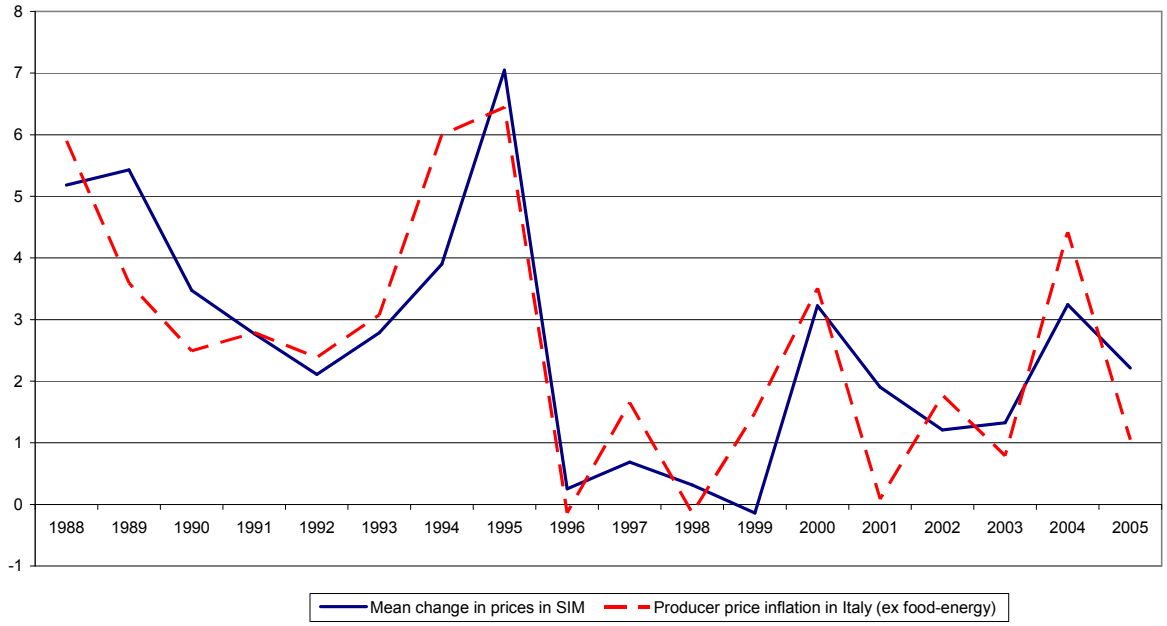


FIGURE 5

PRICE CHANGES IN THE "SIM" SAMPLE AND THE PPI INDEX

(percentage change)



Source: SIM, Istat.

FIGURE 6

DISTRIBUTION OF CAPACITY UTILISATION IN THE "SIM" SAMPLE

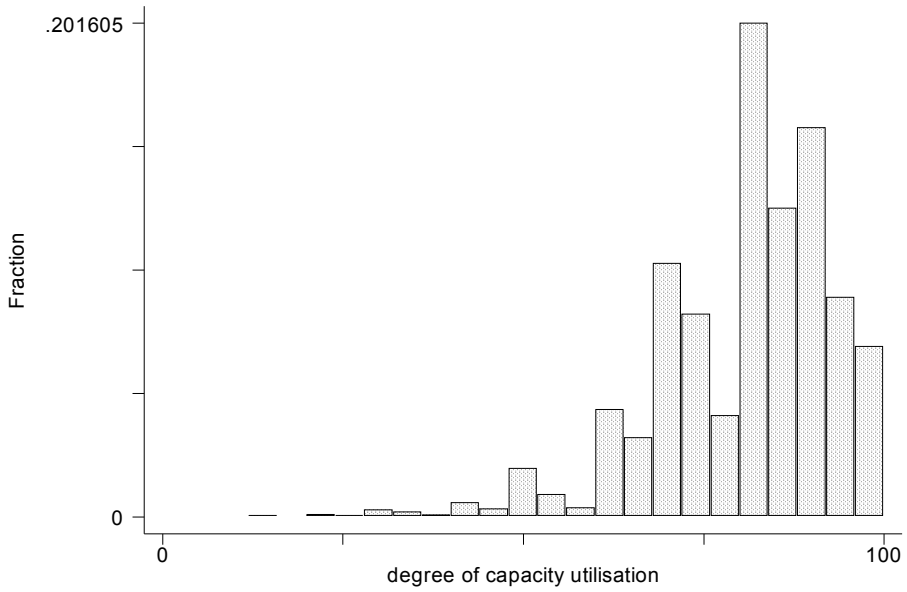
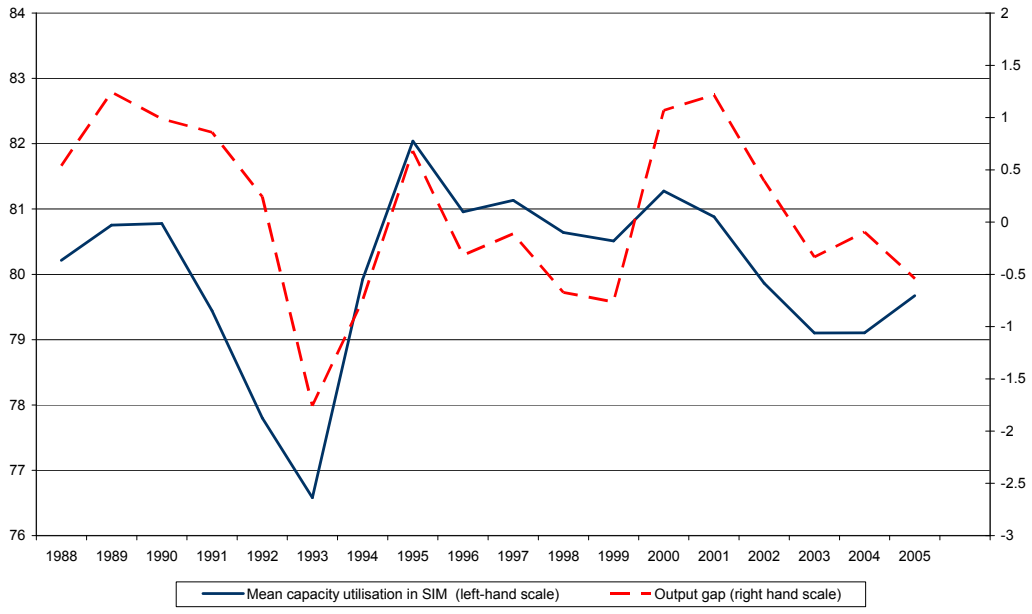


FIGURE 7

CAPACITY UTILISATION IN THE "SIM" SAMPLE AND THE OUTPUT GAP

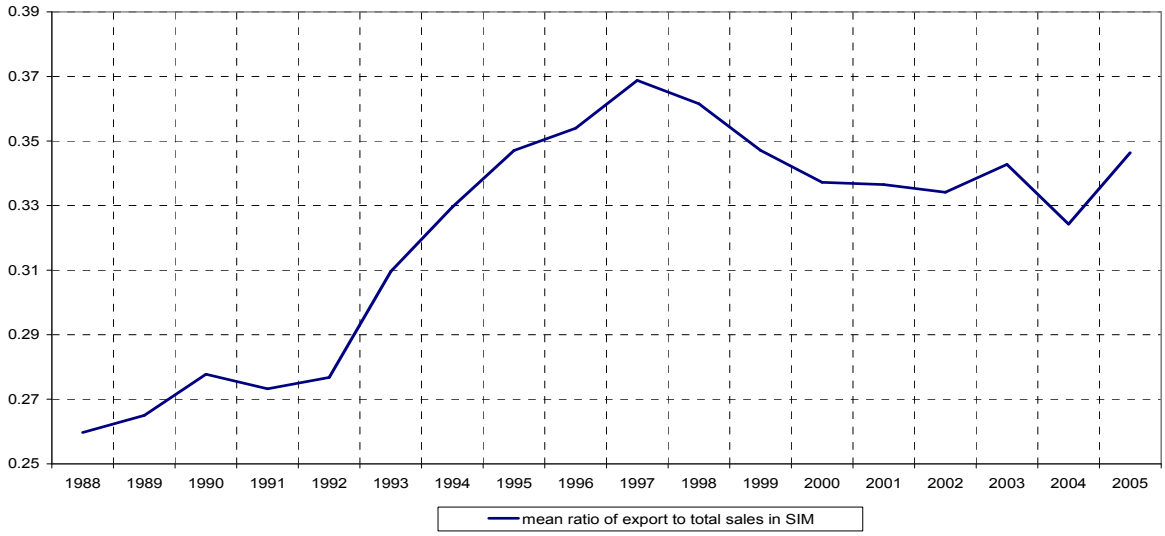
(percentage points)



Source: SIM, author's elaboration on Istat data. Output gap: deviation of GDP at constant prices (in log) from trend. The trend is computed by applying an HP filter over 1986-2005.

FIGURE 8

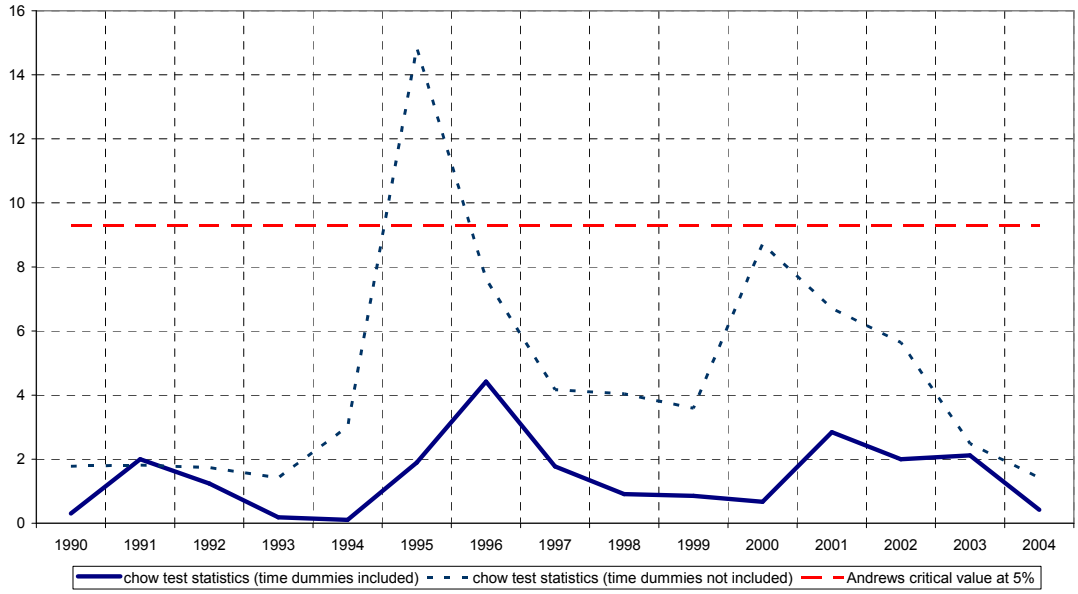
EXPORT/SALES RATIO IN THE "SIM" SAMPLE



Source: SIM.

FIGURE 9

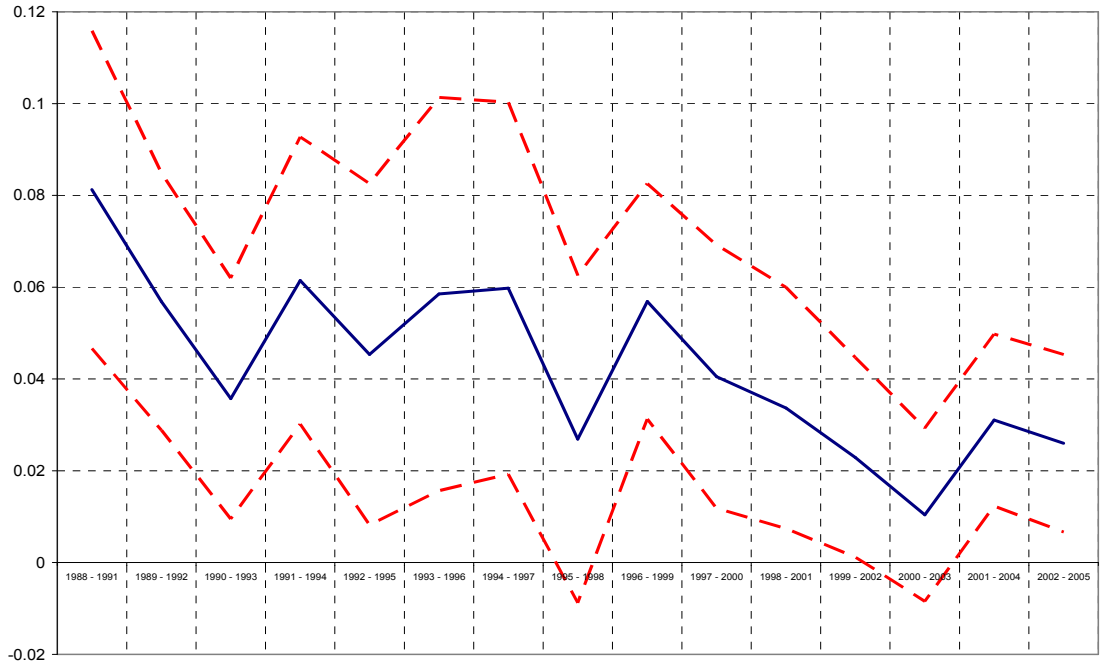
SEQUENCE OF CHOW TESTS ON THE MICRO SUPPLY EQUATION



Sequential Chow test χ^2 statistics based on equation (2). Estimation period: 1988-2005. Break-date reported on the horizontal axis, χ^2-statistics reported on vertical axis. The asymptotic critical value is from Andrews (1993), Table I (based on π_0=.10 and degrees of freedom p=1).

FIGURE 10

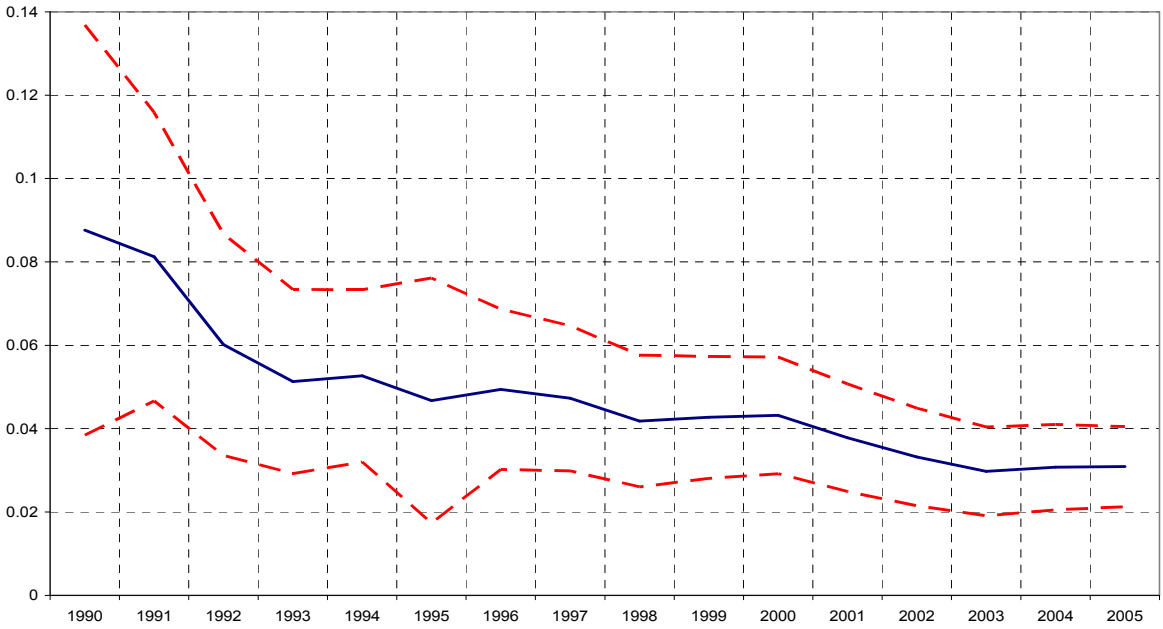
ROLLING ESTIMATES
(4 year moving window)



Rolling panel estimate (4-year sample) of coefficient a_1 in equation (4) in text.

FIGURE 11

RECURSIVE ESTIMATES



Recursive panel estimate of coefficient a_1 in equation (4) in text. End-year of sample is reported on the horizontal axis.

TABLE 1

THE PHILLIPS CURVE IN ITALY

Dependent variable: inflation								
	1970-1979		*1980-1989*		*1990-1997*		*1998-2006*	
output gap	*0.63*	*(**)*	*0.18*		*0.09*		*0.08*	*(*)*
	3.7		*1.3*		*1.6*		*2.2*	
lagged inflation (1)	*0.92*	*(**)*	*0.96*	*(**)*	*0.90*	*(**)*	*0.71*	*(**)*
	21.13		*46.3*		*16.32*		*8.52*	
R2	0.92		0.98		0.93		0.87	
Memo:								
Effect of gap on inflation after 3Q (2)	1.20		0.34		0.21		0.12	

OLS estimate of $\pi_t = b_0 + b_1 ygap_{t-1} + \sum_{i=1}^{4} c_i \pi_{t-i}$, where π_t is 4-quarter CPI inflation; $ygap_t$ is the deviation of GDP at constant prices from its trend, the latter obtained with an HP-filter; the t suffix indicates quarters. (**): significance at 1%; (*): significance at 10%. (1) Sum of coefficients on lagged inflation, Σc_i. (2) Implied effect of a one percentage point persistent increase in the output gap on inflation after 3 quarters.

TABLE 2

RESPONSE OF COSTS TO CAPACITY UTILISATION

	Dependent variable:		
	Δ compensation per employee (1)	Δ unit cost (2)	Overtime / total hours (3)
capacity utilisation	0.10 *(**)*	0.24 *(**)*	0.01 *(**)*
	3.54	*8.01*	*3.46*
time fixed effects	*yes*	*yes*	*yes*
firm fixed effects	*yes*	*yes*	*yes*
R2	*0.03*	*0.02*	*0.01*
period	1989-2004	1988-2004	1999-2005
obs	*8288.00*	*10822.00*	*9877.00*

FE estimator. T-statistics in Italics. (**): significance at 1%. Dependent variable is as follows: (1) percentage change in compensation per employee (total labour cost divided by number of employees, source: balance sheet data ("Centrale dei bilanci"). (2) percentage change in total costs per unit of production (total operating costs divided by potential production), source: "Centrale dei bilanci" for operating costs, SIM for potential production; (3) number of overtime hours as a percentage of total hours, source: SIM

TABLE 3

SAMPLE COMPOSITION

by year		by employees			by industry		
	obs		obs	%		obs	%
1988	768	*0-49*	210	1.1%	*Extractive industries (energy)*	25	0.1%
1989	799	*50-99*	4987	26.3%	*Mining (non-energy)*	64	0.3%
1990	760	*100-199*	4988	26.3%	*Food*	2050	10.8%
1991	795	*200-499*	4870	25.7%	*Textiles and clothing*	2657	14.0%
1992	795	*500-99*	2132	11.3%	*Leather and leather products*	854	4.5%
1993	766	*1000+*	1756	9.3%	*Wood, furniture*	323	1.7%
1994	777				*Paper and paper products, publishing and printing*	897	4.7%
1995	828				*Coke, refined petroleum products, nuclear fuel*	53	0.3%
1996	950				*Chemicals, synthetic fibres*	1324	7.0%
1997	891				*Rubber and plastic products*	883	4.7%
1998	937				*Non-metallic mineral products*	1517	8.0%
1999	1010				*Metals, metal products*	2361	12.5%
2000	1291				*Mechanical equipment and machinery*	2691	14.2%
2001	1580				*Electrical equipment*	1372	7.2%
2002	1607				*Automotive industry*	995	5.3%
2003	1587				*Other manufacturing*	740	3.9%
2004	1250				*Electricity, water, gas supply*	137	0.7%
2005	1552						
total	*18943*	*total*	*18943*	*100.0%*	*total*	*18943*	*100.0%*

Source: SIM.

TABLE 4

MAIN SAMPLE STATISTICS

	# of obs	mean	standard dev	quantiles 1%	5%	25%	50%	75%	90%	99%
main variables:										
percentage change in price	*18943*	2.30	6.08	-15.0	-3.0	0.0	2.0	5.0	8.0	20.0
capacity utilisation, in %	*18943*	80.24	12.76	40.0	65.0	75.0	80.0	90.0	95.0	100.0
measures of exposure to globalisation:										
export share	*18941*	0.33	0.29	0.00	0.00	0.05	0.27	0.55	0.76	0.96
Asian/total imports in firm's sector	*15774*	0.11	0.10	0.00	0.01	0.03	0.06	0.21	0.28	0.57

Source: SIM

TABLE 5

ITALIAN IMPORTS FROM ASIA OVER TOTAL ITALIAN IMPORTS

Industry	NACE	ratio
Manufacture of coke oven products	231	57.2%
Manufacture of games and toys	365	54.9%
Manufacture of luggage, handbags and the like, saddlery and harness	192	47.7%
Dressing and dyeing of fur; manufacture of articles of fur	183	38.3%
Manufacture of sports goods	364	35.6%
Manufacture of motorcycles and bicycles	354	35.2%
Cutting, Shaping and Finishing of ornamental and building stone	267	30.0%
Manufacture of madeup textile articles, except apparel	174	28.7%
Miscellaneous manufacturing n.e.c.	366	28.4%
Manufacture of leather clothes	181	27.7%
Manufacture of Other wearing apparel and accessories	182	27.7%
Manufacture of footwear	193	27.0%
Manufacture of musical instruments	363	26.3%
Manufacture of manmade fibres	247	26.0%
Farming of animals	12	24.3%
Manufacture of nonrefractory ceramic goods other than for construction, refractory ceramic products	262	21.6%
Preparation and spinning of textile fibres	171	21.5%
Textile weaving	172	21.5%
Manufacture of glass and glass products	261	21.1%
Manufacture of watches and clocks	335	20.7%
Manufacture of domestic appliances n.e.c.	297	20.7%
Manufacture of Other textiles	175	18.7%
Manufacture of Other General purpose machinery	292	18.7%
Manufacture of lighting equipment and electric lamps	315	17.8%
Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy	322	17.4%
Manufacture of television and radio receivers, sound or video recording or reproducing apparatus	323	17.0%
Mining and agglomeration of hard coal	101	17.0%
Manufacture of optical instruments and photographic equipment	334	16.9%
Manufacture of accumulators, primary cells and primary batteries	314	16.9%
Manufacture of jewellery and related articles	362	15.4%
Manufacture of Other fabricated metal products	287	15.4%
Manufacture of plastic products	252	14.7%
Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	205	14.6%
Quarrying of stone	141	13.7%
Quarrying of sand and clay	142	13.7%
Mining of chemical and fertilizer minerals	143	13.2%
Manufacture of cutlery, tools and General hardware	286	13.0%
Manufacture of wooden containers	204	12.9%
Processing and preserving of fruit and vegetables	153	10.8%
Manufacture of rubber products	251	10.5%
Other Service activities	930	10.0%
Manufacture of electrical equipment n.e.c.	316	9.1%
processing and preserving of fish and fish products	152	8.9%
Manufacture of ceramic tiles and flags	263	8.0%
Manufacture of bricks, tiles and construction products, in baked clay	264	8.0%
Manufacture of machine tools	294	7.5%
Manufacture of insulated Wire and cable	313	7.3%
Other Mining and quarrying n.e.c.	145	7.1%
Manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle engines	291	6.4%
Manufacture of Other special purpose machinery	295	6.2%
Manufacture of basic chemicals	241	6.2%
Manufacture of vegetable and animal oils and fats	154	5.5%
Manufacture of articles of paper and paperboard	212	5.4%
Manufacture of basic iron and steel and of ferroalloys	271	5.2%
Manufacture of tubes	272	5.2%
Other first processing of iron and steel	273	5.2%
Manufacture of grain mill products, starches and starch products	156	4.9%
Manufacture of instruments and appliances for measuring, checking, testing, navigating	332	4.9%
Forestry, logging and related service activities	20	4.7%
Fishing, fish farming and related service activities	50	4.6%
Growing of crops; market gardening; horticulture	11	4.5%
Manufacture of builders' carpentry and joinery	203	4.0%
Other entertainment activities	923	3.9%
Manufacture of motor vehicles	341	3.2%
Manufacture of refined petroleum products	232	3.0%
Manufacture of Other nonmetallic mineral products	268	2.9%
Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board	202	2.8%
Manufacture of agricultural and forestry machinery	293	2.8%
Manufacture of Other food products	158	2.7%
Manufacture of parts and accessories for motor vehicles and their engines	343	2.6%
Manufacture of medical and surgical equipment and orthopaedic appliances	331	2.3%
Mining of nonferrous metal ores, except uranium and thorium ores	132	2.2%
Sawmilling and planing of wood; impregnation of wood	201	2.2%
Manufacture of paints, varnishes and similar coatings, printing ink and mastics	243	2.2%
Manufacture of Other chemical products	246	2.0%
Manufacture of articles of concrete, plaster and cement	266	1.9%
Publishing	221	1.9%
Manufacture of prepared animal feeds	157	1.8%
printing and Service activities related to printing	222	1.8%
Architectural and engineering activities and related technical consultancy	742	1.8%
Manufacture of basic precious and nonferrous metals	274	1.7%
Manufacture of cement, lime and plaster	265	1.5%
Manufacture of pharmaceuticals, medicinal chemicals and botanical products	244	1.4%
Manufacture of pulp, paper and paperboard	211	1.3%
Manufacture of beverages	159	0.9%
Mining of iron ores	131	0.8%
Manufacture of basic pharmaceutical products	245	0.8%
Manufacture of tanks, reservoirs and containers of metal	282	0.7%
Motion picture and video activities	921	0.3%
Production of salt	144	0.2%
Manufacture of dairy products	155	0.1%
Production, processing and preserving of meat and meat products	151	0.0%
Extraction of crude petroleum and natural gas	111	0.0%
Extraction and agglomeration of peat	103	0.0%
Production and distribution of electricity	401	0.0%

Share of imports from Asia over total Italian imports. Source: *World Trade Analyzer*, Statistics Canada.

TABLE 6

FIRM'S FOREIGN COMPETITORS

	Competitors by geographical area: in industrial countries	in other countries	in China
Product range of the firm's foreign competitors:			
cheap products	9.7%	28.8%	27.2%
average price/quality ratio	24.6%	13.9%	3.5%
medium/high quality	21.2%	6.7%	1.1%
very high quality	9.3%	2.5%	0.6%
not applicable	8.8%	17.1%	28.5%
don't know	7.1%	9.5%	12.0%
don't answer	19.3%	21.6%	27.2%
total	*100%*	*100%*	*100%*
# of observations	*1587*	*1587*	*1587*

Source: SIM (2003 questionnaire), author's calculations. Distribution of answers to the question "what is the average quality of your competitors' products?"

TABLE 7

DELOCALISATION AND OUTSOURCING

	%	*obs*
The firm was producing abroad through subsidiaries or branches in 2004		
yes	13.8%	173
no	15.9%	199
no answer	70.2%	*878*
total	*100.0%*	*1250*
The firm had other forms of foreign collaboration in 2004, namely:		
Commercial deals with foreign firms	13.2%	165
Production deals with foreign firms	8.0%	100
R&D deals with foreign firms	3.3%	41

Source: SIM (2004 questionnaire), author's calculations.

TABLE 8

SUB-SAMPLES: MAIN STATISTICS

	whole sample	propensity to export (1):		share of Asian import (2):		delocalised production (3):		facing Chinese competitors (4):		facing foreign competitors (5):	
		low	high	low	high	no	yes	no	yes	no	yes
mean % change in price	2.3	2.4	2.0	2.2	2.6	2.3	2.4	2.4	2.0	2.4	2.2
mean capacity utilisation	80.2	79.4	82.3	79.9	82.0	80.1	81.9	80.0	81.1	79.8	80.8
mean # of employees	531	541	506	624	353	514	729	539	501	574	471
# of observations	18943	13433	5510	12047	3726	17421	1522	14867	4076	11040	7903

Source: SIM, author's calculations. (1) "High": firms that export more than 50% of sales. (2) "High": top 25%, relative to the share of Asian imports over total imports in own sector; (3) "Yes": firms that were producing goods and services abroad, either directly or through subsidiaries, in 2003; (4) "Yes": firms that faced competitors from China in 2004; (5) "Yes": firms that faced foreign competitors in 2004.

TABLE 9

EFFECT OF CAPACITY UTILISATION ON PRICES / I

Dependent variable: change in prices			
	FE	FE	IV-FE (1)
$CU_{i,t}$	0.031 (**)	0.034 (**)	0.045 (**)
	6.26	*6.71*	*2.36*
$dwage_t$		0.226 (**)	
		9.4	
$dpinput_t$		0.285 (**)	
		24.31	
$dpinput_{t-1}$		0.213 (**)	
		18.71	
time fixed effect	*yes*	*no*	*yes*
firmfixed effect	*yes*	*yes*	*yes*
R2	*0.09*	*0.06*	*0.09*
period	*1988-2005*	*1988-2005*	*1990-2005*
obs	*18943*	*18943*	*10085*
Hausman test (2)*:*			*χ2(17)=.01(100%)*
1st stage R2			*0.50*

Estimate of eq. (4) in main text. Dependent variable: change in firm's prices; t-values in italics. FE = fixed effect estimator. IV = fixed effect instrumental variable estimator. (1) Instruments: lagged capacity utilisation and dummy taking value -1 when the firm is facing low demand, +1 when it is facing high demand, zero otherwise. (2) Hausman test for H_0: that an FE estimator of the equation in the third column is consistent and efficient, against the alternative that only IV-FE is consistent. T-statistics in Italics. (**): significance at 1%. *CU:* firm-level degree of capacity utilisation. *Dwage*: change in nationwide contractual wages. *Dpinput:* percentage change in the aggregate index of prices for material inputs in manufacturing.

TABLE 10

EFFECT OF CAPACITY UTILISATION ON PRICES / II

Dependent variable: change in prices						
a_1 $CU_{i,t}$	0.031 (**)	0.035 (**)	0.034 (**)	0.036 (**)	0.035 (**)	0.049 (**)
	6.26	*5.36*	*5.48*	*6.15*	*6.17*	*3.79*
a_2 $CU_{i,t}$ *$DGlob_{t-2}$		-0.008				
		-0.92				
a_2 $CU_{i,t}$ *$DGlob_{t-1}$			-0.007			
			-0.82			
a_2 $CU_{i,t}$ *$DGlob_{t}$				-0.014		
				-1.68 (*)		
a_2 $CU_{i,t}$ *$DGlob_{t+1}$					-0.012	
					1.41	
$CU_{i,t}$ *$DChinashare_t$						-0.010
						1.52
time fixed effects	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
firm fixed effects	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
R2	*0.09*	*0.08*	*0.08*	*0.08*	*0.08*	*0.09*
period	*1988-2005*	*1988-2005*	*1988-2005*	*1988-2005*	*1988-2005*	*1988-2005*
obs	*18943*	*18943*	*18943*	*18943*	*18943*	*18943*

Estimate of eq. (5) in main text. Dependent variable: change in firm's prices; t-values in italics. Fixed effect estimator. (**): significance at 1%; (*): significance at 10%. *CU:* firm-level degree of capacity utilisation. *$DGlob_t$:* dummy equal to 1 after year 2001 (when China entered the WTO), 0 otherwise. *$DChinashare_t$:* share of trade with China and India over total Italian trade.

TABLE 11

EFFECT OF CAPACITY UTILISATION ON PRICES / III

Dependent variable: change in prices										
	Treatment group is :									
	Exporters		High Asian imports		Facing Chinese competitors		Facing foreign competitors		Delocalized production	
a_1 $CU_{i,t}$	0.038	(**)	0.031	(**)	0.039	(**)	0.026	(**)	0.036	(**)
	6.28		*4.50*		*5.97*		*3.59*		*5.97*	
a_2 $CU_{i,t}$ *$DGlob_t$	-0.023	(*)	-0.019	(*)	-0.019	(*)	-0.008		-0.014	(*)
	2.33		*1.74*		*1.96*		*0.63*		*1.63*	
a_3 $Cu_{i,t}$ *$DGroup_i$	-0.004		0.009		-0.014		0.025	(*)	0.003	
	1.45		*1.30*		*0.94*		*2.09*		*0.15*	
a_4 $CU_{i,t}$ *$DGroup_i$ *$DGlob_t$	0.027	(*)	0.024		0.022		-0.018		-0.005	
	1.81		*1.26*		*1.08*		*1.04*		*0.76*	
a_5 $DGroup_i$ *$DGlob_t$	-2.114		-1.753		-1.550		1.545		0.184	
	1.72	(*)	*1.09*		*0.95*		*1.08*		*0.26*	
time fixed effects	*yes*		*yes*		*yes*		*yes*		*yes*	
firm fixed effects	*yes*		*yes*		*yes*		*yes*		*yes*	
R2	*0.09*		*0.09*		*0.08*		*0.07*		*0.09*	
period	*1988-2005*		*1988-2005*		*1988-2005*		*1988-2005*		*1988-2005*	
obs	*18943*		*15773*		*18943*		*18943*		*18943*	

Estimate of eq. (6) in main text. Dependent variable: change in firm's prices; t-values in italics. Fixed effect estimator. (**): significance at 1%; (*): significance at 10%. *CU:* firm-level degree of capacity utilisation. *DGlob*: dummy equal to 1 after year 2001, 0 otherwise. *DGroup*: dummy taking value 1 if the firm belongs to the group indicated at column heading (export-oriented, sectors with high Asian penetration, facing Chinese competitors, delocalised production). See main text for details.

TABLE 12

EFFECT OF CAPACITY UTILISATION ON PRICES: ROBUSTNESS CHECK I

Dependent variable: change in prices										
	Treatment group is :									
	Exporters		High Asian imports		Facing Chinese competitors		Facing foreign competitors		Delocalized production	
a_1 $CU_{i,t}$	0.034	(**)	0.027	(**)	0.036	(**)	0.023	(**)	0.034	(**)
	5.37		*3.79*		*5.28*		*2.95*		*5.34*	
a_2 $CU_{i,t}$ *$Dglob_{t-1}$	-0.010		-0.007		-0.009		0.006		-0.007	
	1.07		*0.63*		*0.92*		*0.47*		*0.81*	
a_3 $Cu_{i,t}$ *$DGroup_i$	-0.002		0.010		-0.012		0.030	(*)	0.001	
	0.58		*1.48*		*0.75*		*2.35*		*0.05*	
a_4 $CU_{i,t}$ *$DGroup_i$ *$Dglob_{t-1}$	0.016		0.012		0.011		-0.031	(*)	0.000	
	1.11		*0.65*		*0.54*		*1.78*		*0.01*	
a_5 $DGroup_i$ *$Dglob_{t-1}$	-1.634		-1.112		-0.857		2.135		-0.096	
	1.4		*0.72*		*0.52*		*1.5*		*0.14*	
time fixed effects	*yes*		*yes*		*yes*		*yes*		*yes*	
firm fixed effects	*yes*		*yes*		*yes*		*yes*		*yes*	
R2	*0.09*		*0.09*		*0.08*		*0.07*		*0.09*	
period	*1988-2005*		*1988-2005*		*1988-2005*		*1988-2005*		*1988-2005*	
obs	*18943*		*15773*		*18943*		*18943*		*18943*	

Estimate of eq. (6) in main text. Dependent variable: change in firm's prices; t-values in italics. Fixed effect estimator. (**): significance at 1%; (*): significance at 10%. *CU:* firm-level degree of capacity utilisation. *DGlob*: dummy equal to 1 after year 2001, 0 otherwise. *DGroup*: dummy taking value 1 if the firm belongs to the group indicated at column heading (export-oriented, sectors with high Asian penetration, facing Chinese competitors, delocalised production). See main text for details.

TABLE 13

EFFECT OF CAPACITY UTILISATION ON PRICES: ROBUSTNESS CHECK II

Dependent variable: change in prices										
	Treatment group is :									
	Exporters		High Asian imports		Facing Chinese competitors		Facing foreign competitors		Delocalized production	
a_1 $CU_{i,t}$	0.035	(**)	0.028	(**)	0.036	(**)	0.027	(**)	0.035	(**)
	6.23		*4.20*		*5.80*		*3.74*		*5.98*	
a_2 $CU_{i,t}$ *$Dglob_{t+1}$	-0.017	(*)	-0.010		-0.014		-0.012		-0.012	
	1.67		*0.89*		*1.38*		*0.88*		*1.34*	
a_3 $Cu_{i,t}$ *$DGroup_i$	-0.003		0.011		-0.008		0.020	(*)	0.003	
	1.14		*1.56*		*0.55*		*1.77*		*0.15*	
a_4 $CU_{i,t}$ *$DGroup_i$ *$Dglob_{t+1}$	0.017		0.009		0.008		-0.006		-0.006	
	1.02		*0.42*		*0.4*		*0.36*		*1.05*	
a_5 $DGroup_i$ *$Dglob_{t+1}$	-1.413		-1.050		-0.493		0.840		0.173	
	1.06		*0.63*		*0.3*		*0.58*		*0.39*	
time fixed effects	*yes*		*yes*		*yes*		*yes*		*yes*	
firm fixed effects	*yes*		*yes*		*yes*		*yes*		*yes*	
R2	*0.09*		*0.09*		*0.08*		*0.08*		*0.09*	
period	*1988-2005*		*1988-2005*		*1988-2005*		*1988-2005*		*1988-2005*	
obs	*18943*		*15773*		*18943*		*18943*		*18943*	

Estimate of eq. (6) in main text. Dependent variable: change in firm's prices; t-values in italics. Fixed effect estimator. (**): significance at 1%; (*): significance at 10%. *CU:* firm-level degree of capacity utilisation. *DGlob*: dummy equal to 1 after year 2001, 0 otherwise. *DGroup*: dummy taking value 1 if the firm belongs to the group indicated at column heading (export-oriented, sectors with high Asian penetration, facing Chinese competitors, delocalised production). See main text for details.

TABLE 14

EFFECT OF CAPACITY UTILISATION ON PRICES: ROBUSTNESS CHECK III

	Dependent variable: change in prices									
	Treatment group is :									
	Exporters		High Asian imports		Facing Chinese competitors		Facing foreign competitors		Delocalized production	
a_1 $CU_{i,t}$	0.050	(**)	0.039	(**)	0.056	(**)	0.043	(*)	0.049	(**)
	3.81		*2.67*		*3.87*		*2.47*		*3.71*	
a_2 $CU_{i,t}$ *DChinashare $_t$	-0.011	(*)	-0.009		-0.013		-0.011		-0.010	
	1.62		*1.16*		*1.78*		*1.15*		*1.47*	
a_3 $Cu_{i,t}$ *DGroup $_i$	-0.003		0.012		-0.036		0.024	(*)	0.007	
	0.53		*1.46*		*1.11*		*0.88*		*0.31*	
a_4 $CU_{i,t}$ *DGroup $_i$ *DChinashare $_t$	0.004		0.004		0.016		-0.003		-0.003	
	0.73		*0.52*		*1.05*		*0.21*		*0.57*	
a_5 DGroup $_i$ *DChinashare $_t$	-0.367		-0.584		-1.143		0.249		0.126	
	0.87		*1*		*1.26*		*0.23*		*0.24*	
time fixed effects	*yes*		*yes*		*yes*		*yes*		*yes*	
firm fixed effects	*yes*		*yes*		*yes*		*yes*		*yes*	
R2	*0.09*		*0.09*		*0.07*		*0.07*		*0.09*	
period	*1988-2005*		*1988-2005*		*1988-2005*		*1988-2005*		*1988-2005*	
obs	*18943*		*15773*		*18943*		*18943*		*18943*	

Estimate of eq. (6) in main text. Dependent variable: change in firm's prices; t-values in italics. Fixed effect estimator. (**): significance at 1%; (*): significance at 10%. *CU:* firm-level degree of capacity utilisation. *DGlob*: dummy equal to 1 after year 2001, 0 otherwise. *DChinashare*: share of trade with China and India over total Italian trade. See main text for details.

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