Inflation Targeting and Deregulation*

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Abstract

I evaluate the disinflationary effect of Inflation Targeting and its interaction with product market deregulation reforms, that reduce inflation for supply-side reasons. Using a sample of 21 OECD countries, I show that, after controlling for product market deregulation, the effect of Inflation Targeting is indeed quantitatively important and statistically significant. Moreover, product market deregulation has a relevant effect on its own and there is evidence of complementarity between the two reforms. I find that the disinflation in the Inflation Targeting countries starts before the adoption of the new regime, coinciding with the beginning of the deregulation process. However, while the effect of deregulation is temporary, permanent disinflation is reached only with Inflation Targeting. I propose an extension of the New Keynesian Phillips curve with an explicit role for market deregulation to rationalize the timing of the two reforms suggested by the empirical analysis.

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1 Introduction

The regime of Inflation Targeting (IT henceforth) has been adopted by an increasing number of Central Banks since the beginning of the 1990s. This new regime requires a numerical quantified objective of inflation, the absence of other nominal intermediate targets and a high level of transparency and accountability of the Central Bank.

Previous empirical studies report contrasting results of the adoption of IT on inflation, with a part of the researchers that acknowledges its effectiveness and the other that claims a simple case of mean reversion. In fact, in order to evaluate properly its effectiveness, IT should be framed in the general disinflation of the 90s, partly due to globalization, to more responsible policies and to the enhancing effect of deregulation and increasing competition.

In this work I evaluate the effect of IT on the inflation rate heeding the other important phenomena that contributed to the generalized disinflation observed in the same period, with particular attention to the product market deregulation. I show that, when controlling for product market deregulation, the effect is relevant and statistically significant. However, the product market deregulation has an important role on its own, and the evidence points its complementarity with IT. In particular, I find that the disinflation in the IT countries starts before the adoption of the new regime, coinciding with the beginning of the deregulation process. However, while the effect of deregulation is temporary, permanent disinflation is reached only with IT. I propose an extension of the New Keynesian Phillips curve with an explicit role for market deregulation to rationalize the timing of the two reforms suggested by the empirical analysis.

I use a sample of 21 OECD countries[1], 9 of which have adopted IT during the period 1985-2003. The choice of restricting to the OECD countries hinges on the homogeneity of the sample in terms of inflation histories and economic and political structure, as well as common shocks. To account for deregulation in the product market, I refer to the index coded by Conway and Nicoletti (2006), and I derive a series of dummy variables that signal a change in regulation. This indicator of non-manufacturing regulation covers energy, transport and communication over the 1975-2003 period in 21 OECD countries. It provides the longest

[1] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherland, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kindom, United States. The other are excluded due to the lack of data on deregulation.

time-series currently available, to my knowledge, for comparing product market regulations across countries. Non-manufacturing sectors represent two thirds of the economic activity and they are limited affected by import penetration. This index allows to control for the impact of domestic market policies, while the effect of globalization is assumed to be similar among the countries in the sample. I investigate the role of monetary institution reforms in particular in relation with product market deregulation.

Using a Difference In Difference (DID) panel data model with country fixed effect and time trend, I find that the effect of IT is large and statistically significant, on average it accounts for a reduction of 0.7 percentage points of the inflation rate. Nevertheless, I find a relevant effect of the product market deregulation reforms, which leads, on average, to a reduction of the inflation rate of about 0.4. The interaction effect of the two reforms is large and it is increasing in the size of deregulation.

The DID estimates provide the average effect of IT on inflation, assuming the effect is constant across years. However, an important issue is that the new regime has been adopted at different points in times. A way to overcome this is to artificially rescale time using a series of dummies that identify k-years before and after the adoption. When using these series of dummies is possible to estimate the effect of the adoption year by year. I estimate[2] the effect of IT from 5 years before the adoption to 5 years after. I find that the inflation rate drops already 2 years before the adoption. This result might hide the effect of announcement, but, even when coding the dummy using the year in which, for the first time, IT was mentioned in public[3], the decline in inflation begins before the adoption. If only IT were responsible for the disinflation, I would expect a decline in inflation rate after the adoption, when controlling for time trend, country fixed effects and covariates. Looking at the raw data for the IT countries, appears that all countries have started deregulation, on average, two years before. Hence, the dummies before the IT adoption are not identified because they are confounded with other reforms. In order to have a better understanding of the timing I restrict my attention to 2 years before and 3 after the adoption, while I consider only the average effect for the span 5 to 3 years before and for more than 3 years of adoption. In subsequent steps, I split the deregulation dummy for IT and non-IT countries, and further in before and after

[2]I follow Jacobson et al. (1993), among others.

[3]see McCallum (1998)

the IT adoption. Furthermore, among the deregulation reforms before IT, I focus only on those implemented 1 or 2 years before. I argue that the drop in inflation rate before the IT adoption is due to the deregulation reforms. When focusing the attention only on the reforms implemented just before the IT adoption, the dummies are able to capture all the effect of the disinflation. Given the paucity of data, the results are only suggestive. However, when turning the attention only to the effect of IT only after the adoption, the regressions show that the major impact occurs one year after the adoption, while the average effect stabilize on -0.7 after 3 years. Moreover, the effect of deregulation seems to differ between the IT and non-IT groups both before and after the adoption. Furthermore, I verify whether the assumption of temporary effect of deregulation imposed on the data is reasonable. It does not appears to have long lasting effects nor for IT nor for the non-IT group.

The empirical results suggest that deregulation was an important factor in explaining disinflation and its timing even though with temporary effects. I propose an extension of the New Keynesian Phillips curve with an explicit role for market deregulation which rationalizes the timing of the two reforms suggested by the empirical analysis. Following Blanchard and Giavazzi (2003), I use the elasticity of substitution to proxy for the level of regulation in the economy[4], and I assume that it is time-varying. I assume it follows an increasing trend during the deregulation reform period. I simulate a general equilibrium model with a very simplified demand side (exogenous monetary policy). In this way I am able to replicate the timing of the disinflation in the IT countries: an initial decrease in inflation rate due to the product market deregulation and the permanent disinflation only afterwards.

I verify whether the results are sensitive to the definition of deregulation reform, selecting different thresholds. In particular, given the evidence of non parallel performances due to deregulation, I follow Abadie's (2005) methodology in order to account for this issue. The methodology is designed for cross-sectional data and I initially collapse my dataset to pre-post adoption[5]. The result points to an average reduction in the inflation rate for the IT countries, but with high standard errors due to the limitation of data points and the noisy

[4]A higher elasticity of substitution means a lower market power of the firm, so a lower barriers to entry or lower regulation.

[5]There are several example in the IT evaluation literature that follow this procedure: Willard, Vega-Winkel... . In this way the dynamics of the data is lost and, more importantly and it is not the best way to proceed since the adoptions happened in different moments, see Bertrand et al. (2004). {Moreover, chosing 1993 as threshold, I lose from the IT sample Spain, Norway and Switzerland}

data due to an approximate boundary between before and after adoption.

1.1 Literature review

The interest in the IT regime has lead to a growing number of studies on the evaluation of the policy. Ball and Sheridan (2002) are critical about the enthusiasm usually shown for IT. They claim that there is evidence of simple mean reversion, in order to establish the true effect of the policy it is necessary to account for endogeneity of the choice. Gertler (2005) replies that the policy chosen could be the reason for the observed mean-reversion result. In response to Ball and Sheridan's paper, Wu (2003) shows that the IT countries experienced a decrease in their average inflation rates after the adoption with no evidence of mean reversion. Hyvonen (2004) using a larger sample concludes that inflation convergence is not a stable property of cross-country inflation performance but the result of similar policies (or common objectives). Willard (2006) confirms Ball and Sheridan's results using a Cross-Section model. Vega and Winkerlried (2005) try to account for a possible endogenous selection in the IT group by performing propensity score matching. They find that, with the limit of a cross-sectional data set, there is no sufficient evidence to discard the benefits of IT: it matters for mean inflation in both industrialized and developing countries. Pertusson (2004) tries to disentangle whether the observed fall in inflation in the IT countries has been driven by a global phenomenon or it is related to the adoption of the new framework. The results point out that IT leads on average to a 2.5% to more than 3% fall in inflation, depending on the sample, even though the effect of IT is not found to be significant in the sample of industrial IT.

Batini and Laxton (2005) analyze in particular the experience of emerging economies, and they find a beneficial effect.

The other strand of literature of reference is the series of papers on the effect of globalization on the inflation rate in the 90s. Rogoff (2003) recognizes the merits of monetary institutions, but he reckons also the mutually reinforcing effect of globalization, deregulation and the increase in competition[6]. Ciccarelli and Mojon (2005) assess the importance of global factors for the domestic inflation and their study give support for the increasing

[6] See Blanchard and Philippon (2003) on the reduction of "quasi-rents" to monopolistic firms and unions and Nicoletti et al. (1999, 2001) for a broader OECD study on deregulation.

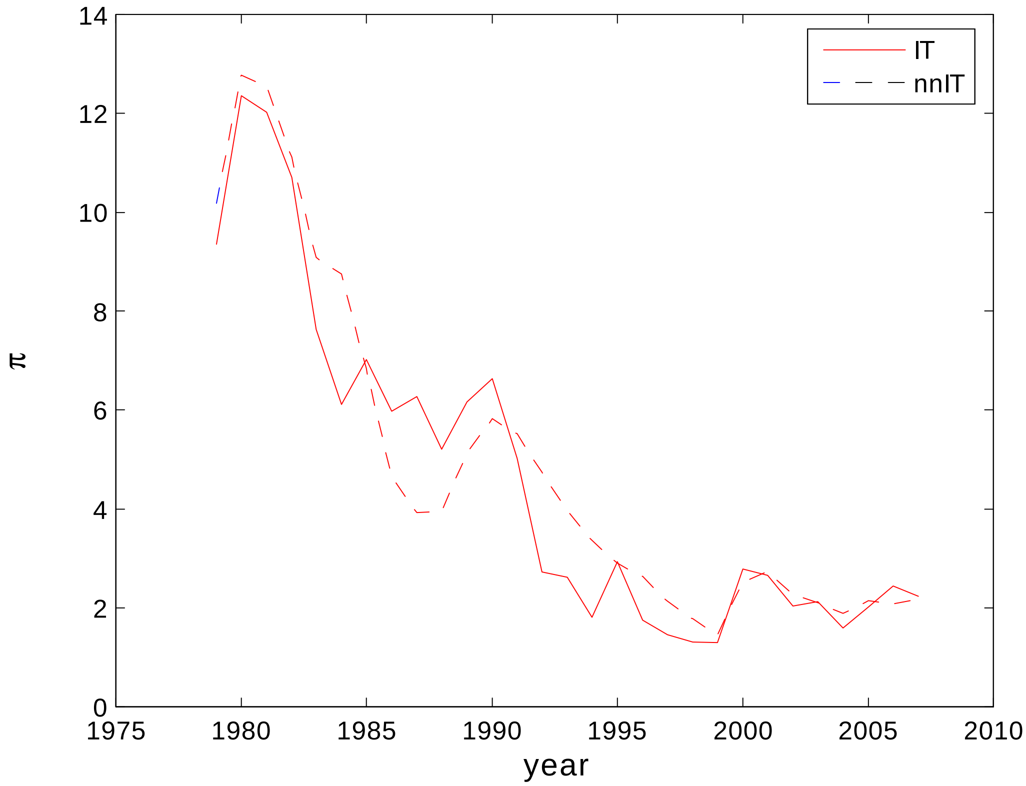


Figure 1: Average inflaton rate for the IT and non-IT group.

attention given to global factors in the conduct of monetary policy. Borio and Filardo (2007) suggest a decline in the dependence of inflation from solely domestic factors and an increase in the relevance of global factors. White (2008) concludes that both domestic factors, such as a more effective monetary policy and an increase in domestic regulation, competition and productivity; and international factors, such as a global "saving glut" and an increase in global competition, contribute to an explanation of the observed reduction in inflation.

In this work, I evaluate the role of monetary institution reforms in relations, in particular, with product market deregulation and with global common trends.

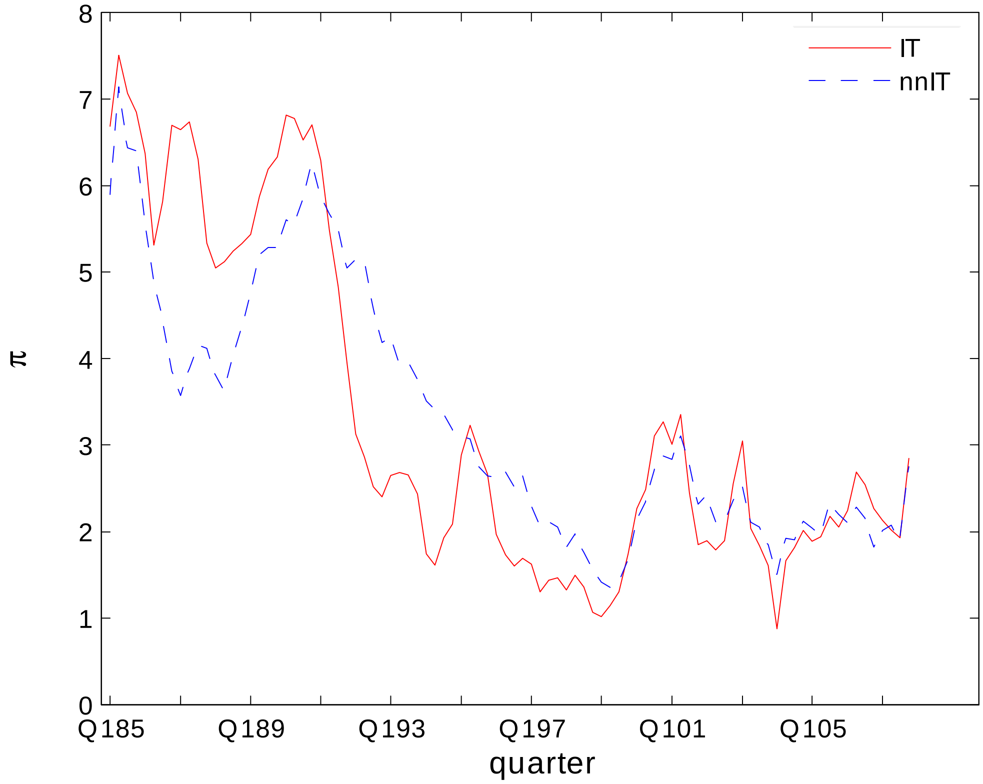


Figure 2: Average inflation rate, quarterly data.

2 Empirical Results

2.1 Preliminary Evidence

As it is shown in figure 1, from a visual point of view the performance of inflation in IT and non-IT OECD countries seems to follow the same pattern up to the mid 1980s. Afterwards the two groups split on different inflation rate levels, with the group of IT countries starting from a higher level of inflation and beginning the disinflationary process in the early 1990s (before the other group), only to converge once more roughly after 2000. The timing of the disinflation in the IT group seems to coincide with the bulk of the adoptions (1990-1995). The pattern of disinflation can be seen in more details with quarterly data in fig. 2. Thus, the relevant question, from a policy perspective, is whether the observed convergence is the result of just luck or the contribution of good policies, simply the effect of a global disinflation trend that has affected all countries around the world or the combined effects of reforms. In particular it is worthwhile to investigate whether the reform of the monetary policy framework has been relevant in curbing the inflation rate.

I start analyzing the graphical behavior of the variables usually indicated as possible explanation of the observed disinflation in the 90s. Rogoff (2003) acknowledges the virtues of more responsible monetary policy, he excludes the effect of fiscal policy, but emphasizes the mutual reinforcing effect of globalization and deregulation.

I begin with the deregulation in the product markets. I use the index of product market regulation in non manufacturing sectors in the OECD countries (ETCR[7]) constructed by Conway and Nicoletti (2006). Non-manufacturing sectors represent two thirds of the economic activity, and where the most of regulation is concentrated. Thus, domestic regulation policies have a major impact also due to the limited import penetration in these sectors.

I plot the average ETCR for both the IT and non-IT. As it can be seen from figure 2, the level of regulation for the non-IT is higher than the other group, maybe due to the presence of more continental European countries compared with more Anglo-Saxon in the group of IT countries. The difference in the dynamic of regulation emerges more strikingly when analyzing the difference in the index between non-IT and IT. The difference increases

[7] ETCR represents a summary index of regulation in 7 non-manufactoring sectors: airlines, telecoms, electricity, gas, post, rail and road freight. It is a 0-6 index reflecting increasing restrictiveness of regulatory provisions to competition. For more details see Conway and Nicoletti (2006).

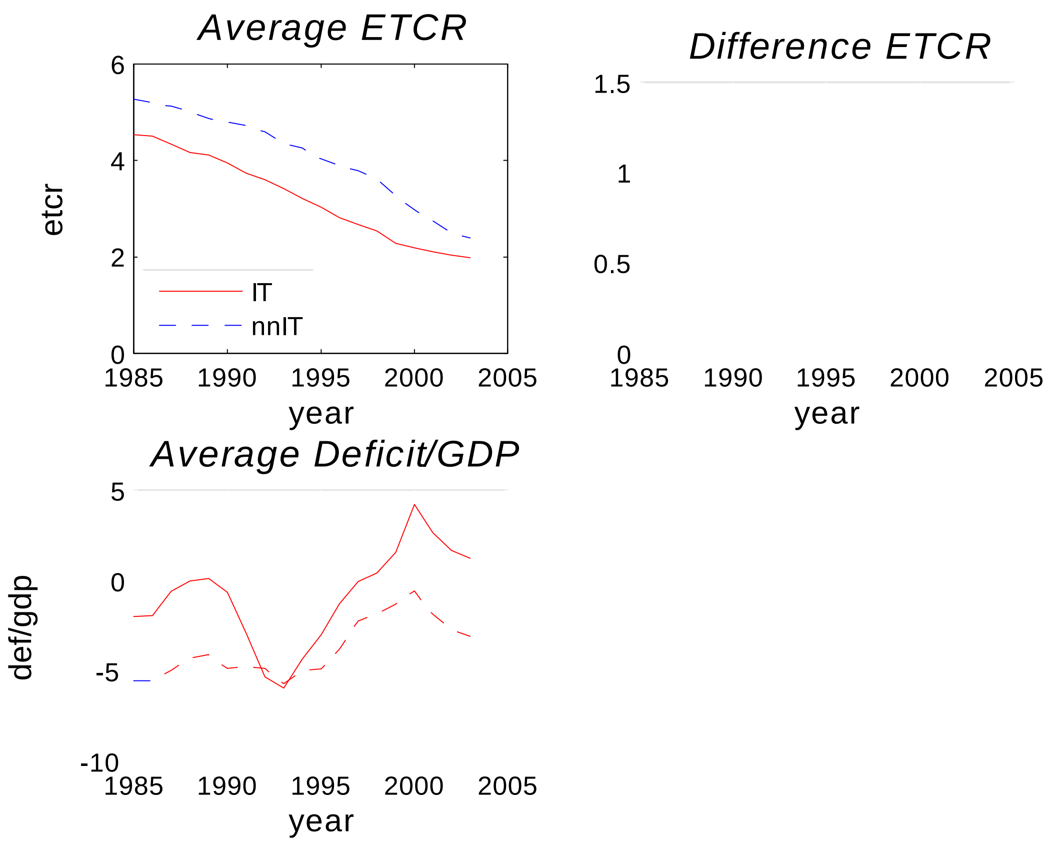


Figure 3: Average Regulation index for IT and non-IT, Difference between the two group and Average of Deficit/GDP for the two groups.

until 1997 highlighting the series of deregulation reforms implemented in the IT countries. In fact, only after 1997 also the group of non-IT catches up, with a rapid deregulation.

Another possible explanation could be a more responsible fiscal policy. The pattern here, on average, is reversed, with the IT countries with a more sound fiscal position before 1992 and afterward following the same pattern as the non-IT. The dynamics here might depend on the presence among the non-IT of two heavy debtors (Italy and Greece) and a reversion of the government budget sign for Finland.

It is interesting to notice that, while the deregulation reforms preceded the adoption of IT, the improvement of government balance budget followed. Moreover, looking at the data for the single countries that adopted IT, it appears that, in general, the countries have experienced a series of deregulation reforms starting a couple of years before the monetary policy switch, while the improvements in the government balance budget occurred after the monetary policy change with the exception of few cases of fiscal responsibility [prudence] (Switzerland, Finland).

In order to tackle the issue of the effect of IT on the performance of inflation in the OECD countries, I estimate the effect using a panel DID estimator controlling for policies that can affect the inflation rate and that have been implemented contemporaneously.

2.2 Data and Methodology

I select a group of 21 OECD countries[8]. I focus only on a sample of OECD countries because they present similar economic and institutional structures and it is reasonable to assume that they are exposed to similar aggregate shocks, which allows a comparison of the inflation dynamics. My sample begins in 1985, five years before the first adoption of IT and ends in 2003 due to the limited availability of data on regulation.

I adopted a conservative view classifying Switzerland as IT, because... The consequence will be a more conservative estimate of the effect of switching to IT given the past history of low inflation of the Swiss Central Bank. I include Spain, even though it has never exited the (Exchange Rate Mechanism) ERM during the IT phase (this might be questionable, but

[8] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherland, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States. Luxembourg is not included due to the lack of ETCR data.

the fluctuations bands during those years were wide $\pm 15\%$ with respect to ECU). The ECB is not classified as IT because of the explicit double pillar nor is the FED because of the lack of an explicit inflation target[9].

For estimating the effect of IT I use the tool of DID. Its identifying assumption requires that the policy change not to be systematically related to other factors that affect the outcome. A way to overcome this issue is to include in the regression covariates which can account for the possibility that the random samples within a group have systematically different characteristics in the two time periods. (Wooldridge)

Given the impossibility of a fully randomized experiment, it is crucial that the choice of IT was not driven by systematic differences between the groups. In fact, in both groups are present countries that started with high level of inflation (non-IT: Greece, Italy, Portugal; IT: New Zealand), countries that suffered from speculative attacks (non-IT: Italy; IT: Finland, Sweden, United Kingdom), and had a record of low and stable inflation (non-IT: Germany; IT: Switzerland). Moreover, on average the level of regulation is higher in the non-IT due to the presence of high regulated countries like France, Greece and Italy, but in both groups are present countries with a low degree of regulations (IT: United Kingdom, non-IT:USA), and countries that followed the same path of deregulation (Australia-Japan, Switzerland-Austria, Norway-Germany, Spain-Belgium). There are no systematic differences between the two groups.

Following the preliminary analysis, and the literature on global disinflation, the control variables included in the regression are lagged inflation rate, to take into account the autoregressive nature of inflation rate; government deficit as a percentage of GDP, in order to account for a possible effect of more responsible fiscal policy. I also include trade (sum of imports and exports as a percentage of GDP) as an imperfect proxy for the economy openness. Moreover, I include also a dummy variable that accounts for the duration of currency crises (CURDUR), I include the lagged variable because more significant. Observing the experience of the IT adoption, many switched to the new regime after a currency crises (Finland, Sweden, United Kingdom) and it controls for possible spikes in the inflation rate due to the crises and reduces the effect of IT.

I want to focus my attention on the role of increase in competition in OECD countries

[9](see the debate on transforming Fed in an explicit Inflation Targeter)

in explaining the disinflation. For this reason, I derive a series of dummy variables from the variable ETCR coded by Conway and Nicoletti (2006). The variable ETCR follows a downward trend and I prefer to focus on the effect of policy changes in the domestic regulation. Thus, I construct a series of dummies that highlights changes in the ETCR index. For example, dummy02 is equal to 1 every time there is a reduction in the ETCR index of at least 0.2. I also consider the simple change in the index ($\Delta etcr$).

In constructing the data, I classify a Central Bank as IT in a given year if it has adopted the regime for at least six months. In the regression I control for country fixed effects and trend to account for systematic differences in the observations and a systematic trend in the inflation rate[10].

An issue in the evaluation literature is the bias in the estimates of the standard errors in the case of autocorrelated treatment. Bertrand et al. (2004) suggest a simple correction of the variance-covariance matrix:

$$W = (V'V)^{-1} \left(\sum_{j=1}^{N} u_j^{'} u_j \right) (V'V)^{-1}$$

where N is the total number of states, V is the matrix of independent variables and u_j is defined for each state to be $u_j = \sum_{t=1}^{T} e_{jt} v_{jt}$ where e_{jt} is the estimated residual for state i at time t and v_{jt} is a row vector of dependent variables[11]. I comply to this requirement.

Previous empirical works report contrasting results on the effect of IT on inflation depending on the sample used and the choice between cross-section or panel data. The choice of cross-section limits the number of available data points. It introduces noise because the adoption date differ among the treated. As a consequence, either an arbitrary year is chosen as a divide between pre and post treatment or comparisons are made between different periods of time. I adopt the Panel Data analysis.

2.3 Panel Results

I first estimate the basic regression containing only IT and the controls:

[10] Given the limited sample I control for time trend instead of time dummies.

[11] In the paper, they show the correction works well up to 20 states for 20 years. My sample consists of 21 states for 19 years.

$$\pi_{it} = \alpha_1 + \alpha_2 \pi_{it-1} + \beta x_{it} + \theta w_{it} + \varepsilon_{it}$$

where x_{it} represents the IT reform and w_{it} the set of other controls.

The effect of IT is relevant and statistically significant when using Panel Data, but the effect captured by the IT dummy might confound other contemporaneous or previous reforms that have an effect at the moment of the adoption of the monetary policy regime. In particular, I focus my attention on the role of product market deregulation:

$$\pi_{it} = \alpha_1 + \alpha_2 \pi_{it-1} + \beta x_{it} + \gamma z_{it} + \theta w_{it} + \varepsilon_{it}$$

where z_{it} represents the deregulation reforms.

Then, I estimate the full model which includes IT, all the deregulation dummies and the interaction terms:

$$\pi_{it} = \alpha_1 + \alpha_2 \pi_{it-1} + \beta x_{it} + \gamma z_{it} + \delta (xz)_{it} + \theta w_{it} + \varepsilon_{it}$$

In this way I want to estimate the effect of both reforms while the interaction term tries to capture the extra effect when they are implemented at the same time.

Finally, I single out the role of deregulation:

$$\pi_{it} = \alpha_1 + \alpha_2 \pi_{it-1} + \gamma z_{it} + \theta w_{it} + \varepsilon_{it}$$

The main point observing the results is that the effect of IT in curbing inflation is relevant and statistically significant. However, also deregulation has an important effect on its own and the interaction term is increasing in the size of the deregulation reform. This can reflect the importance of the combination of the two reforms in reinforcing their effect on inflation rate.

I choose as benchmark result the case of deregulation of at least 0.2[12] [see table 1]. The estimated effect of IT is of the same magnitude as in the baseline model and statistically significant, implying a reduction of 0.79 point of the inflation rate. The deregulation dummy is relevant and statistically significant on its own (-0.56). When including the interaction

[12] In this case the episodes considered are 121 (30% of the observation points); while the interaction term considers 25 episodes (6%).

term in the regression, the coefficient of IT is smaller and non significant, also the estimated effect of the deregulation dummy is smaller but statistically significant, while the interaction term is large (-0.72) and statistically significant.

In the case of a lower threshold 0.1[13] [see table 2], the estimated effect of IT is larger (-0.81) and statistically significant, while the estimated effect of deregulation decreases (-0.50), still statistically significant. This signal the effect of including also smaller reforms. When including the interaction term, the estimated effect of IT shrinks, the deregulation dummy is of the same magnitude as before, while the interaction term is not significant but of the predicted sign.

Finally, I consider the case of only large reforms: the threshold of 0.3[14] [see table 3]. The estimated effect of IT is of the same magnitude of the previous cases (-0.74), while the deregulation effect is less than a half (-0.24) and non significant. When the interaction term is included, the estimated effect of IT shrinks, the effect of deregulation becomes negligible and statistically non significant, while the combined effect of the two reforms is large (-1.11) and statistically significant.

The effect of IT appears relevant and statistically significant when controlling for deregulation reforms. There is evidence of interaction between the two policies. In particular, it seems that larger reforms are more effective in combination with IT.

In the analysis I have assumed so far that the effect of deregulation reforms is temporary. To verify this, I construct the dummy $reform$ based on dummy02. It assumes that the effect of a reform lasts for 3 years after its implementation. The estimated effect is small and non significant, confirming the absence of permanent effects[15].

Moreover, I have assumed that the effect of deregulation is the same for both IT and non-IT groups. However, since there is evidence of complementarity with IT, this is not the case. I split the deregulation dummy02 for IT (both before and after adoption) and non-IT group. The effect is much larger in the IT countries: -1.17 and statistically significant versus -0.11 and non significant.

[13] In this case the episodes considered are 197 (49% of the observation points); while the interaction term considers 45 episodes (11%).

[14] In this case the episodes considered are only 57 (only 14% of the observation points), while there are only 9 episodes in which there are both large deregulation reforms and IT (2%).

[15] Using lagged dummies, the effect seems to fade away after one year. This pattern is repeated for both IT and nnIT countries.

The use of dummies for estimating the effect of deregulation is a way to aggregate the data. Instead of dummy based on a threshold, it is possible to use the change in the regulation index ($\Delta ecrt$). Also in this case, the estimated effect of IT is the same as in the previous analysis, while the estimated effect of the change in deregulation is 1.07 and significant at 10%. The ETCR is a 0-6 index in increasing restrictiveness to competition. So, a certain decrease in the regulation index determines (on average) a more than one to one decrease in inflation rate. Looking at the effect in details, splitting $\Delta ecrt$ for IT and non-IT, the effect is strong and significant for the IT group (2.1) and small and non significant for the non-IT. I prefer to use the absolute change instead of the percentage change.

It seems that the effect of convergence among countries towards low levels of inflation rate was also the contribution of important reforms aimed to the improvement of monetary policy and of increasing the level of competition in the product market.

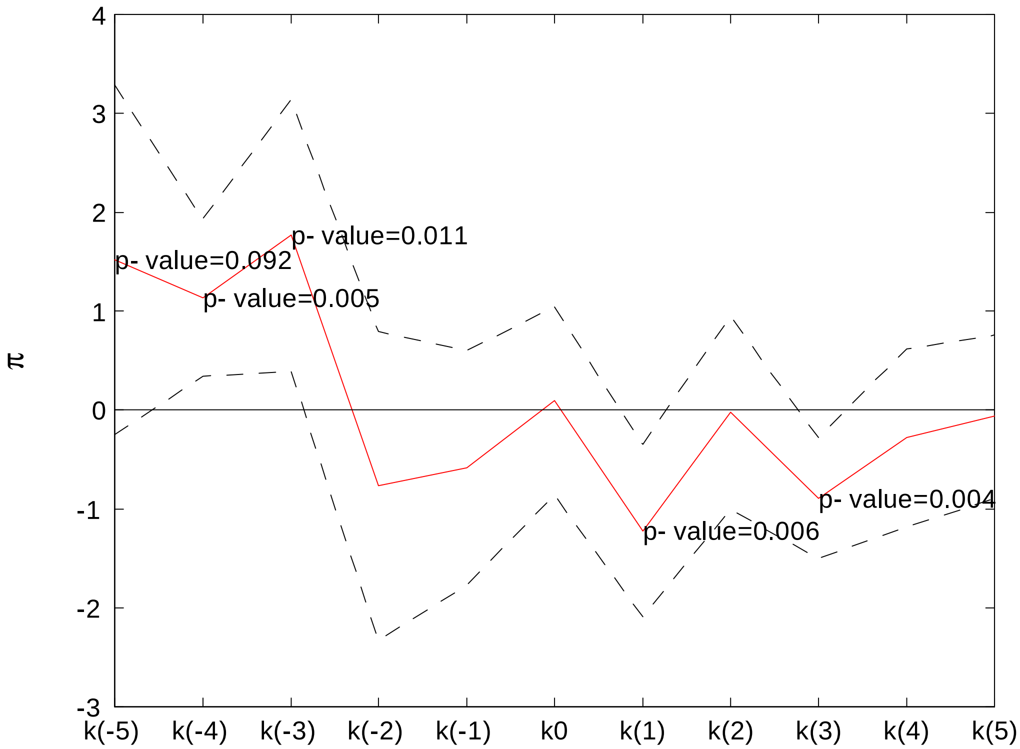
It is not possible to exclude that the past two decades have presented general good conditions for the stabilization of the inflation rate. Nevertheless, there is evidence that improvements in the monetary policy institutions and reforms in the product market sectors had positive effect in curbing inflation rate. The fact that the combined effect of IT and aggressive deregulation reforms is large suggest that some countries that had poorer record of inflation performance implemented a series of reforms for getting back on track.

2.4 Yearly Effect

An important issue in evaluating IT is that the new regime has been adopted at different points in times. A way to overcome this, is to artificially rescale time using a series of dummies that identify k-years before and after the adoption. this allows to estimate the effect of the adoption year by year. I follow Jacobson et al. (1993), and I construct a series of dummy variables for 5 years before and 5 after the adoption of IT. I regress the inflation rate on these dummies controlling for the past inflation rate, the deregulation dummy and the same controls as in the DID analysis, time trend and country fixed effects.

$$\pi_{it} = \alpha_1 + \alpha_2 \pi_{it-1} + \sum_{k=-5}^{n} D_{it}^{k} \delta_k + \gamma z_{it} + \theta w_{it} + \varepsilon_{it}$$

This permits to gain a better insight of the dynamic effect of the IT adoption.



I plot in figure 3 the estimated values with the 95% confidence interval. From the graphs it appears clear that countries that adopted IT started out with a higher inflation rate. Surprisingly, the disinflation process begins two periods before the adoption of IT even controlling for the dummy of deregulation.

This result might hide the effect of announcements, but, even when coding the IT dummy using the year in which for the first time IT was mentioned in public, see McCallum (1998), the decline in inflation still begins before the adoption. In fact, dates change only for Canada and New Zealand. The Governor of Bank of Canada, in a memorial lecture in 1988, stated the central role of price stability in Canadian monetary policy; the first official target was announced only in 1991. The Reserve Bank of New Zealand act in 1989, enacted by the Parliament, specifies that price stability is the priority of monetary policy. Moreover, it requires the Governor and the Minister of Finance to make periodic Policy Target Agreements regarding the price to be targeted and its allowable range. The first official target in March

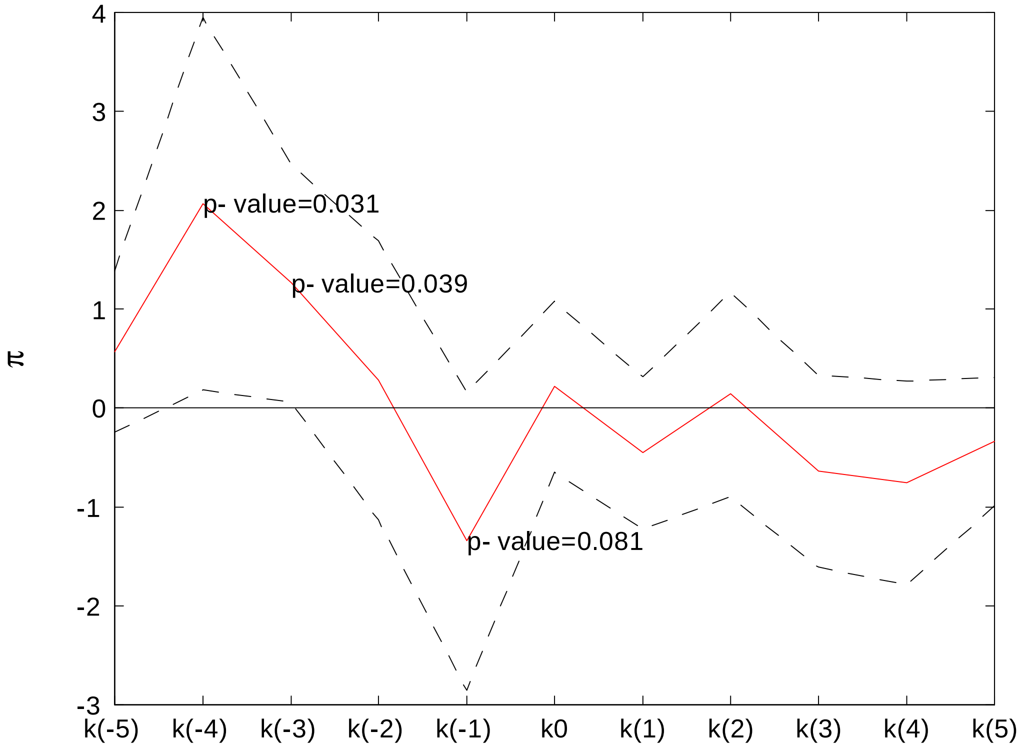


Figure 4: The yearly effect of IT when using the announcement date.

1990.

Even considering the announcement effect, the disinflation begins before the actual adoption. This result highlights the possible presence of other events that preceded the adoption. One of these is the beginning of deregulation. In fact, looking at the raw data, all IT countries implemented those kind of reforms in the years before the adoption. In order to have a better understanding of the timing I restrict my attention to 2 years before and 3 after the adoption, while I consider only the average effect of the span 5 to 3 years before and after 3 years. In subsequent steps, I split the deregulation dummy for IT and non-IT countries, and further in before and after the IT adoption. Furthermore, among the deregulation reforms before IT, I focus only on those implemented 1 or 2 years before. I argue that the drop in inflation rate before the IT adoption is due to the deregulation reforms. When focusing the attention only on the reforms implemented just before the IT adoption, the dummies are able to capture all the effect of the disinflation.

The raw data show the implementation of other important reforms just before the adoption of an explicit inflation target for monetary policy. When focusing only on those events, it is possible to single out their contribution to the disinflation.

Having identified the role of deregulation reform, I turn to the analysis of the effect of IT after the adoption. I separate the effect of the year of the adoption, 1,2,3 years after and more than 3. In this way it is possible to verify the different impact of the new regime at the adoption, and whether it has permanent effects or only temporary ones. I show that the major impact of IT happens one year after the adoption, but the effect stabilize on an average effect of -0.8 for a span of adoption longer than 3. This should confirm the idea that a monetary policy switch has a permanent effect on the inflation rate.

From the empirical analysis emerges that the effect of both IT and deregulation is important in explaining disinflation. Nevertheless, the effect of monetary policy reform has permanent effects on the inflation rate while deregulation has only temporary effects.

This is result helps explaining the dynamics of inflation in the IT countries. The deregulation process in the product market triggered a price reduction and a reduction of the inflation rate, but Monetary Policy stabilized the inflation rate.

I propose a simple extension of the New Keynesian Phillips Curve with an explicit role for product market deregulation in order to analyze the inflation dynamics observed in the data.

3 The model

[add brief introduction]

3.1 New Keynesian Phillips Curve

From the empirical analysis it is possible to conclude that IT was successful in reducing inflation, but the deregulation in the product market played a relevant role. For this reason it is important to take it into account when analyzing the inflation dynamics. Moreover, it emerges that the effect of deregulation is temporary and it was particularly relevant at the beginning of the disinflation process. There is some evidence of enhancing effect of the two reforms.

I propose an extension of the basic New Keynesian model with time-varying elasticity of substitution between goods in the flavor of Blanchard and Giavazzi (2003) and Steinsson (2005) to analyze the role of deregulation on reducing the inflation rate and the timing observed in the data. I draw from Blanchard and Giavazzi's work the idea of proxing product market regulation with elasticity of substitution between goods. In the paper the elasticity of substitution between goods depends on regulation in the goods market through two channels: the number of firms, which ultimately depends on the entry cost, and a generic taste parameter, whose increase can be viewed as a higher substitutability among products due to various forms of deregulation such as the reduction in trading barriers. Previously, Steinsson (2005) assumes that the elasticity of substitution is stochastic. In his work this is only a way to introduce cost push shocks. Instead, I assume that the elasticity of substitution is time varying growing at a given rate during the reform period and remaining at the higher level thereafter. The dynamics of the (inverse of the) elasticity of substitution mimics the behavior of the regulation index which appears to have decreased in all OECD countries but in particular in the IT countries before the adoption of the new regime.

I find that deregulation, i.e. the increase in the elasticity of substitution, leads to a slight decrease in the inflation rate only during the deregulation process. Nevertheless the disinflation does not persist when the elasticity of substitution stabilizes at the final higher level. The inflation is curbed only by a credible disinflation. Nevertheless, the deregulation triggers an initial disinflation even without a change in monetary policy.

As a first step, I use a model with a very simplified demand side. This approach allows to focus only on the link between deregulation and inflation behavior. {The drawback is that the monetary policy is exogenous and it does incorporate the effect of deregulation }

I derive the New Keynesian Phillips curve in an environment of monopolistically competitive firms, with staggered price setting à la Calvo where a fraction $(1-\omega)$ of firms are allowed to reset their prices every period. Firms behave optimally. The only difference with the standard framework is the fact that the elasticity of substitution is not fixed.

In log deviation, the price level in period t

$$p_t = \omega p_{t-1} + (1-\omega)p_t^*$$

where the optimal price of forward looking firms is:

$$p_t^* = (1-\omega\beta)E_t\left[\sum_{i=0}^{\infty}(\omega\beta)^i\left(\varphi_{t+i}+p_{t+i}-\frac{1}{(\theta-1)^2}\theta_{t+i}\right)\right]$$

or

$$p_t^* = (1-\omega\beta)\left(\kappa x_t + p_t - \frac{1}{(\theta-1)^2}\theta_t\right)$$

where $\varphi_t = \kappa x_t$[16], in order to express the marginal cost in terms of the output gap.

By combining the last equations is possible to obtain the usual New Keynesian Phillips curve with one additional term:

$$\pi_t = \beta E_t\pi_{t+1} + \frac{(1-\omega)(1-\omega\beta)}{\omega}\kappa x_t - \frac{(1-\omega)(1-\omega\beta)}{\omega(\theta-1)^2}\theta_t$$

Instead of including in the model an IS equation and an interest rate rule, I prefer to keep the specification as simple as possible. Following Mankiw and Reiss (2002) I model the demand side simply as:

$$m = p + y$$

where m is the nominal GDP. "This can be viewed as a quantity-theory approach to aggregate demand, where m is interpreted as the money supply and log velocity is assumed constant at zero. Alternatively, m can be viewed more broadly as the incorporating the many other variables that shift aggregate demand. m is assumed to be exogenous."

Using this simple specification, I want to analyze the effect of deregulation in conjunction with credible disinflation. Controlling for the credible disinflation (I am presenting only the case of surprised disinflation for the moment), I can focus on the effect of the deregulation in the goods market assuming that the elasticity of substitution between goods is time varying. In particular I assume that the elasticity of substitution grows at constant rate for the periods in which the deregulation is implemented and remains at the final higher level afterwards.

I simulate the basic NKPC and compared with the extension with time varying elasticity of substitution. Despite the fact that my data are yearly, I prefer to simulate the model

[16] In the standard New Keynesian model $\kappa = \sigma + \eta$ consumption and labor elasticity. I set $\kappa > 1$.

for quarterly data for easier to read results. [I keep the total change in the elasticity of substitution the same across the different simulations but I vary the speed of the deregulation reform. In fact, the speed is the ratio between the total jump in the elasticity of substitution and the duration of the policy implementation.]

The effect of deregulation with no change in monetary policy leads to a decrease in the inflation rate limited to the deregulation process. In fact, when the elasticity of substitution stabilizes at a higher level, the inflation rate reverts back.

The simulation of the NKPC with deregulation reproduces the timing of disinflation in the data.

The drawback of this simplification is that monetary policy is assumed exogenous and it does not take into account the reduction in inflation rate due to the deregulation leading to a deflation for some periods.

3.2 Hybrid Phillips Curve

The evidence shows that the major impact of IT is one year after the adoption, hinting the presence of a backward looking component in the price setting. For this reason, I also develop an hybrid Phillips curve with product market deregulation. I assume that a fraction λ of the firms allowed to reset their prices in period t adopt a backward looking behavior and set their prices according to a rule of thumb[17], so now the index for the newly set prices evolves according to:

$$p_t^* = (1-\lambda)p_t^F + \lambda p_t^B$$

where p_t^F denotes the price of the forward looking firm which behave exactly like the previous optimizing firms, while p_t^B is the price set by the backward looking firms.

$$p_t^F = (1-\omega\beta)E_t\left[\sum_{i=0}^{\infty}(\omega\beta)^i\left(\varphi_{t+i} + p_{t+i} - \frac{1}{(\theta-1)^2}\theta_{t+i}\right)\right]$$

The rule of thumb adopted by the backward looking firm is:

$$p_t^B = p_{t-1}^* + \pi_{t-1}$$

[17]Following Gali Gertler (1999).

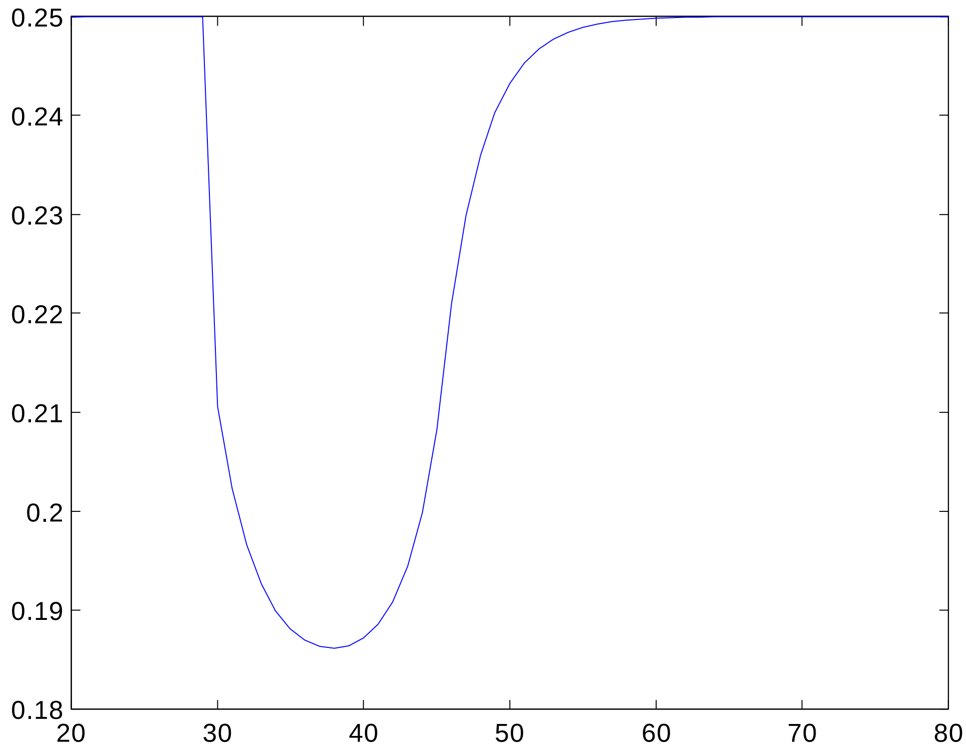


Figure 5: NKPC. Inflation dynamics with deregulation from 30 to 45, (with an increase of the elasticity by half its value).

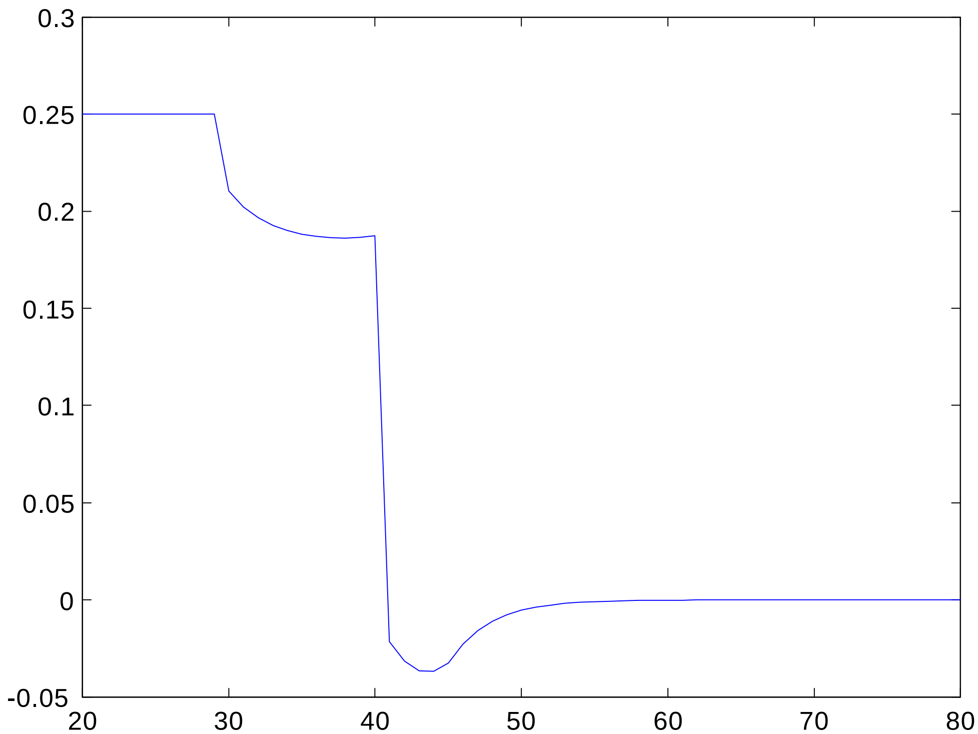


Figure 6: NKPC. Inflation dynamics with deregulation from 30 to 45, (with an increase of the elasticity by half its value) and permanent disinflation starting in t=40.

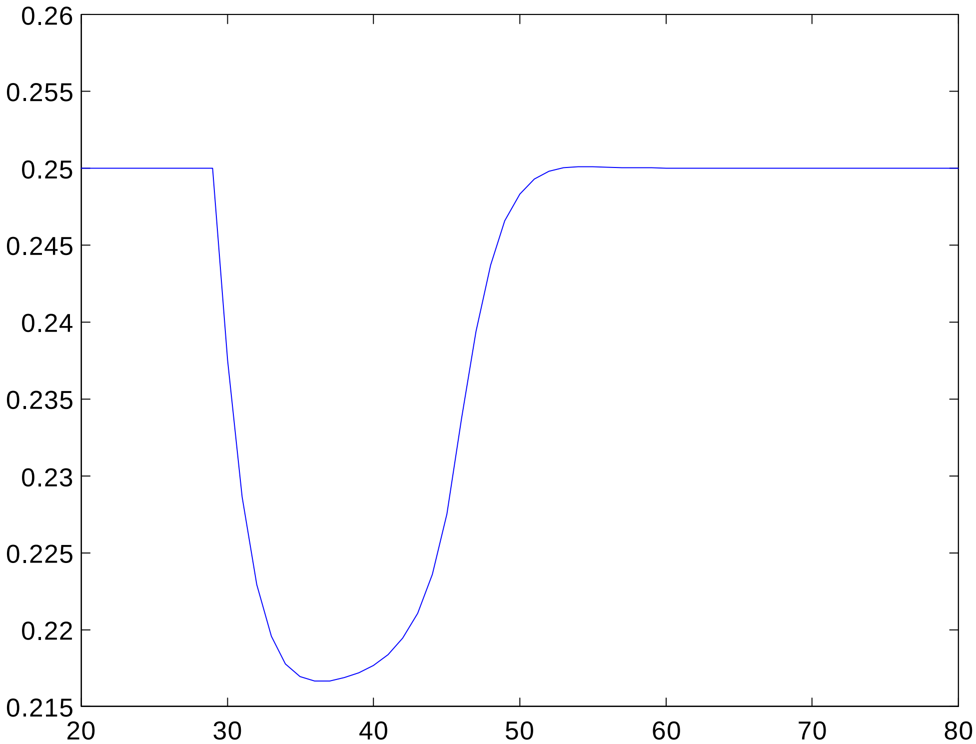


Figure 7: HNKPC. Inflation dynamics with deregulation from 30 to 45, (with an increase of the elasticity by half its value).

so according to this ad hoc rule the backward looking firm set its price equal to the previous round of adjustments with a correction for inflation[18].

Combining the previous equations it is possible to obtain the following Hybrid Phillips curve with the additional term for elasticity of substitution:

$$\begin{aligned}\pi_t \quad &= \quad \frac{\lambda}{\omega+\lambda\left[1-\omega\left(1-\beta\right)\right]}\pi_{t-1}+\frac{\omega\beta}{\omega+\lambda\left[1-\omega\left(1-\beta\right)\right]}E_t\pi_{t+1}+\frac{\left(1-\lambda\right)\left(1-\omega\right)\left(1-\omega\beta\right)}{\omega+\lambda\left[1-\omega\left(1-\beta\right)\right]}\kappa x_t \\ &\quad -\frac{\left(1-\lambda\right)\left(1-\omega\right)\left(1-\omega\beta\right)}{\omega+\lambda\left[1-\omega\left(1-\beta\right)\right]\left(\theta-1\right)^2}\widehat{\theta}_t\end{aligned}$$

[18] Gali-Gertler for more insight.

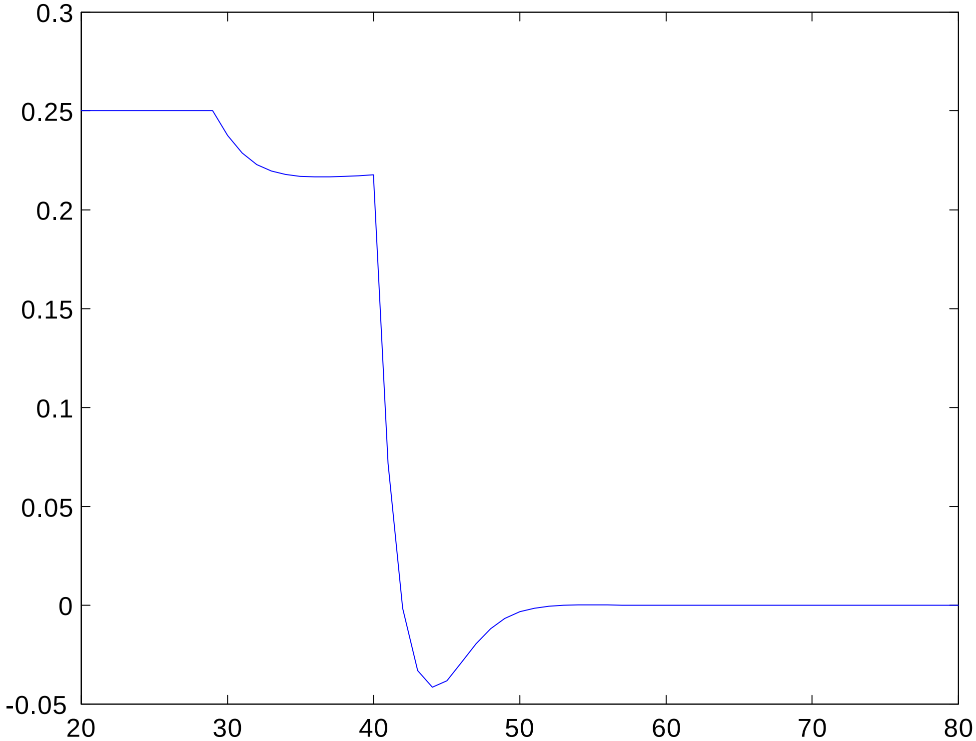


Figure 8: HNKPC. Inflation dynamics with deregulation from 30 to 45, (with an increase of the elasticity by half its value) and permanent disinflation starting in t=40.

3.3 Economic Policy lesson

My analysis confirms the importance of a responsible Monetary Policy in controlling inflation rate. The institutional change was a clear signal of the new focus. However, it also highlights the role of product market deregulation for a successful disinflation.

An interesting question would be to see whether different market regulation matters in a common policy area (Euro).

4 Appendix

4.1 Data appendix

CURDUR: dummy variable for currency crises duration. Source Ghosh, Gulde and Wolf dataset (available only till 1999, updated till 2003). I used the lagged variable.

DEFICIT_GDP: government balance budget as a percentage of GDP. Source IFS and SOURCE OECD.

ETCR: aggregate indicator of regulatory reforms. Obtained as the average of indicators in six main sectors(Airlines, Telecom, Electricity, Gas, Post and Rail Road). The index goes from 0 to 6 with 0 indicating the lower level of regulation and 6 the highest level of regulation in the market. Source Conway and Nicoletti (2006).

Several dummies are derived from this index

IT: inflation targeting dummy, half year rule.

LT_INT_RATE: interest rate of long term bond usually 10 years. Source IFS

INFL: inflation, CPI annual percentage change. Source: IFS.

TRADE: import+export as a percentage of GDP. Source WDI 2006.

4.2 Robustness checks

The subdivision of the reform ranges has been arbitrary, in order to check the relevance of the results I use different ranges. I consider reforms that led to a decrease of the regulation index of at least 0.05, 0.15 or 0.25.

The overall results are the same: the effect of IT is relevant (roughly a decrease on average of 0.7% annual inflation), deregulation reforms have, on average, an effect of reducing (annual) inflation of about 0.5% when considering all reforms, or only the ones with a decrease in the index of at least 0.15; in these cases the interaction terms are not large nor significant. This could suggest that the effect of the two reforms is significant but there is no extra effect when they are implemented at the same time. The effect of aggressive reforms only is not relevant but, in these cases, the interaction terms are large and statistically significant suggesting the extra effect of aggressive reforms combined with reforming also the monetary institutions.

In the same flavour of the previous analysis, I break down the reforms into ranges: I analyze the subdivision 0.05-0.15, 0.15-0.25 and above. The previous results are confirmed: the effect of reforms is relevant and statistically significant, the interaction term with the aggressive reforms is always large and statistically significant. The decrease in inflation in the IT countries is the result of better monetary policy and goods markets liberalization. The switch to IT represents a general shift towards a liberal paradigm [see paper on Israel political economy]

Since the regulation index is the average of seven subindexes, I explore the role of deregulation in the single sectors for the disinflation process. I use a subdivision that mirrors the one for the general case, i.e. I use the range 0.01-0.07; 0.07-1.4; 1.4-2.1 and above for every single index; and the ranges 0.01-1; 1-2 and above. The ranges used are wider that the general case in order to recreate a parallel between the single index and the average. Electricity and Telecommunications are the two sectors for which any range of reforms is relevant and statistically significant [tables not reported], while the only two with no significant range are Gas and Post. I construct two sets of indexes: one that is the average of the regulation in the Electric and telecommunication sectors the other that excludes only Gas and Post. I repeat the same analysis as before, and the previous results are confirmed.

—>mention the analysis per sector of deregulation.

4.3 Self-selection

One of the limit of the DID approach is that it is based on a very strong identifying assumption. In particular, it requires that the policy change not to be systematically related to other factors that affect the outcome. A way to overcome this issue is to include in the regression covariates which can account for the possibility that the random samples within a group have systematically different characteristics in the two time periods. (Wooldridge)

I follow this path by including in the Panel DID regression control variables that can influence the outcome (inflation) differently in the two groups. In particular I propose as relevant characteristic to control for the level of deregulation in the goods market. [use it in the introduction]

The main issue in the treatment literature is that, unlike the medical or biological trials, there is no pure randomization in the assignment to treatment and control groups, but individuals determine whether they receive treatment, and their decision might be related to the benefits of the adoption, i.e. there is self-selection into treatment. (if selection into treatment is influenced by individual transitory shocks on past outcomes.)

For this reason I follow the methodology proposed by Abadie (2005). He develops a Semiparametric DID estimator which controls for differences in observed characteristics that can create non-parallel outcome dynamics between treated and controls. He proposes a simple two-step method that can be used to estimate the average treatment on the treated. His methodology proposes to estimate the propensity score (the probability of access the treatment) and then use the estimated p-score to weight the difference in outcome between treated and controls after the exposure to the treatment. This weighting scheme allows to impose the same distribution of the covariates on the treated and the controls.

Abadie derives the ATET which is a weighted average of temporal differences in the outcome variable, with weights that depend on the estimated propensity scores.

$$E[\pi^1(1) - \pi^0(1)/D = 1] = E\left[\frac{\pi(1) - \pi(0)}{P(D = 1)} . \frac{D - P(D = 1/X)}{1 - P(D = 1/X)}\right]$$

Moreover, it is possible to study the ATET for a subset of the population if the desired level of aggregation is lower than the entire sample.

I first apply the estimator to cross-section data. Since countries adopted the new regime in different moments, it is impossible to divides the sample between pre and post treatment. Moreover it is important to keep the comparison between average data over the same period of time to account for the possibility of trending. Thus, I choose 1993 as a rough divide[19] since the bulk of countries have adopted by that year. In this way I lose Spain adopting in 1995 and Switzerland and Norway adopting only after 2000, they will be counted as non-IT.

[19] Pre treatment variables are computed for 1985-1992, and post treatment 1993-2003.

I control in the first step estimation of the propensity score for the variables that could have induced the choice of the new regime[20]. When the treatment effect is computed conditional on the level of regulation the estimated effect is smaller than in the DID Panel estimate (-0.336) and with a much higher standard errors due also to the smaller sample.

****I adapt this framework at the panel setting trying to capture the dynamics of the data. It is difficult to define the difference in performance of interest, but I decide to look at the annual difference

Applying this framework to a panel

The possible mechanism at work: combined reforms in product markets and in monetary policy institution, the deregulation in the product market reduces inflation rate while the CB gains credibility and locks in expectations.****

Even when controlling for possible endogeneity of the choice, the estimated effect is of the same magnitude of the DID analysis, not significant due to the limitation of data points. The evidence persists of an effect of IT but also of the contribution of the deregulation. The open question is how the two reforms interact.

4.4 Tables

[20] I include inflation rate, level of ETCR, long tem interest rate, legor_uk (british roots) and deficit_gdp.

Table 1: Sample: 21 OECD Countries

IT	Adoption Date	Non-IT
Australia	Q1-1993	Austria
Canada	Q1-1991	Belgium
Finland	Q193-Q498	Denmark
New Zealand	Q1-1990	France
Norway	Q4-2000	Germany
Spain	Q494-Q498	Greece
Sweden	Q1-1993	Ireland
Switzerland	Q1-2000	Italy
United Kingdom	Q4-1992	Japan
		Netherlands
		Portugal
		United States

Table 2: **DID Panel Data, sample 1985-2003**

	(1)	(2)	(3)	(4)
infl(-1)	0.666 ***	0.660 ***	0.655 ***	0.679 ***
	(0.064)	(0.066)	(0.067)	(0.056)
it	-0.720 *	-0.787 **	-0.527	
	(0.360)	(0.372)	(0.392)	
dummy02		-0.559 **	-0.407 *	-0.526 **
		(0.229)	(0.205)	(0.231)
dummy02*it			-0.720 ***	
			(0.174)	
deficit/gdp	0.048	0.042	0.039	0.058
	(0.043)	(0.040)	(0.041)	(0.044)
trade	0.039 **	0.039 ***	0.039 ***	0.036 **
	(0.014)	(0.014)	(0.014)	(0.014)
curdur(-1)	0.752 *	0.845 **	0.810 **	0.902 **
	(0.380)	(0.377)	(0.354)	(0.420)
trend	-0.092 ***	-0.084 ***	-0.090 ***	-0.098 ***
	(0.023)	(0.021)	(0.023)	(0.025)
R^2	0.630	0.637	0.630	0.666

Notes: Dependent variable: yearly inflation. Regressions include constant and country FE. Cluster s.e. are reported in brackets.

Table 3: **DID Panel Data, sample 1985-2003**

	(1)	(2)	(3)	(4)
infl(-1)	0.666 ***	0.657 ***	0.656 ***	0.676 ***
	0.064	0.065	0.065	0.054
it	-0.720 *	-0.813 **	-0.766 *	-0.449 **
	0.360	0.371	0.417	0.190
dummy01		-0.497 **	-0.480 **	
		0.188	0.184	
dummy01*it			-0.074	
			0.280	
deficit/gdp	0.048	0.043	0.042	0.059
	0.043	0.042	0.043	0.046
trade	0.039 **	0.040 ***	0.040 ***	0.036 **
	0.014	0.014	0.015	0.014
curdur(-1)	0.752 *	0.856 **	0.849 **	0.909 **
	0.380	0.380	0.378	0.429
trend	-0.092 ***	-0.079 ***	-0.080 ***	-0.094 ***
	0.023	0.020	0.021	0.024
R^2	0.630	0.628	0.627	0.660

Notes: Dependent variable: yearly inflation. Regressions include constant and country FE. Cluster s.e. are reported in brackets.

Table 4: **DID Panel Data, sample 1985-2003**

	(1)	(2)	(3)	(4)
infl(-1)	0.666 ***	0.663 ***	0.663 ***	0.681 ***
	(0.064)	(0.064)	(0.063)	(0.054)
it	-0.720 *	-0.740 **	-0.581	
	(0.360)	(0.363)	(0.352)	
dummy03		-0.241	-0.046	-0.206
		(0.159)	(0.155)	(0.154)
dummy03*it			-1.113 ***	
			(0.379)	
deficit/gdp	0.048	0.048	0.041	0.062
	(0.043)	(0.042)	(0.044)	(0.045)
trade	0.039 **	0.039 ***	0.040 ***	0.036 **
	(0.014)	(0.015)	(0.014)	(0.014)
curdur(-1)	0.752 *	0.775 *	0.778 **	0.830 *
	(0.380)	(0.383)	(0.356)	(0.426)
trend	-0.092 ***	-0.091 ***	-0.095 ***	-0.103 ***
	(0.023)	(0.022)	(0.023)	(0.026)
R^2	0.630	0.630	0.626	0.658

Notes: Dependent variable: yearly inflation. Regressions include constant and country FE. Clusters.e. are reported in brackets.

Table 5: **DID Panel Data, sample 1985-2003**

	(1)	(2)
infl(-1)	0.660 ***	0.657 ***
	(0.066)	(0.066)
it	-0.787 **	-0.687 *
	(0.372)	(0.376)
dummy02	-0.559 **	
	(0.229)	
dum02(it)		-1.169 ***
		(0.426)
dum02(nnit)		-0.113
		(0.142)
deficit/gdp	0.042	0.029
	(0.040)	(0.042)
trade	0.039 ***	0.038 ***
	(0.014)	(0.014)
curdur(-1)	0.845 **	0.830 **
	(0.377)	(0.376)
trend	-0.084 ***	-0.092 ***
	(0.021)	(0.024)
R^2	0.637	0.632

Notes: Dependent variable: yearly inflation. Regressions include constant and country FE. Cluster s.e. are reported in brackets.

Table 6: **DID Panel Data, sample 1985-2003**

	(1)	(2)	(3)	(4)
infl(-1)	0.666 ***	0.660 ***	0.657 ***	0.678 ***
	0.064	0.065	0.064	0.055
it	-0.720 *	-0.763 **	-0.382	
	0.360	0.369	0.445	
detcr		1.072 *	0.666	0.991 *
		0.532	0.474	0.542
detcr*it			2.152 **	
			0.964	
deficit/gdp	0.048	0.047	0.039	0.062
	0.043	0.041	0.043	0.044
trade	0.039 **	0.038 ***	0.040 ***	0.035 **
	0.014	0.014	0.015	0.014
curdur(-1)	0.752 *	0.842 **	0.841 **	0.895 **
	0.380	0.393	0.381	0.438
trend	-0.092 ***	-0.085 ***	-0.093 ***	-0.099 ***
	0.023	0.021	0.023	0.025
R^2	0.630	0.636	0.625	0.664

Notes: Dependent variable: yearly inflation. Regressions include constant and country FE. Clusters.e. are reported in brackets.

Table 7: **DID Panel Data, sample 1985-2003**

	(1)	(2)	(3)
k(-5)	1.585 *	1.576 *	1.578 *
	0.970	0.964	0.962
k(-4)	1.213 ***	1.207 ***	1.199 ***
	0.398	0.394	0.393
k(-3)	1.804 ***	1.836 ***	1.818 ***
	0.731	0.734	0.723
k(-2)	-0.818	-0.629	0.272
	0.773	0.759	0.671
k(-1)	-0.460	-0.363	0.096
	0.649	0.624	0.472
k(0)	0.247	0.295	0.285
	0.482	0.466	0.474
k(1)	-1.289 ***	-1.126 ***	-1.159 ***
	0.438	0.441	0.442
k(2)	0.053	0.087	0.087
	0.484	0.460	0.461
k(3)	-1.070 ***	-0.974 ***	-0.988 ***
	0.317	0.306	0.310
k(4)	-0.409	-0.349	-0.352
	0.477	0.444	0.466
k(5)	-0.050	-0.093	-0.078
	0.419	0.407	0.410
dummy02		-0.355 ***	-0.288 **
		0.130	0.124
k(-2)dum02			-1.431
			1.262
k(-1)dum02			-1.088
			1.369
R^2	0.610	0.611	0.614

Notes: Dependent variable: yearly inflation. Regressions include constant and country FE. Robust s.e. are reported in brackets.

Table 8: **DID Panel Data, sample 1985-2003**

	(1)	(2)	(3)
-5<=k<-3	1.316 ***	1.302 ***	1.336 ***
	0.475	0.470	0.474
k(-2)	-0.934	-0.739	0.003
	0.797	0.779	0.803
k(-1)	-0.753	-0.649	-0.196
	0.630	0.614	0.548
k0	-0.078	0.040	0.264
	0.522	0.516	0.510
k1	-1.396 ***	-1.089 **	-0.856 *
	0.494	0.539	0.527
k2	-0.212	-0.089 *	0.127
	0.549	0.580	0.561
k3	-1.098 ***	-0.881	-0.688
	0.427	0.464	0.441
k>3	-0.373	-0.329	-0.170
	0.415	0.417	0.413
dummy02	-0.401 ***		
	0.132		
dum02it(before)		-0.774 *	
		0.426	
k(-2)dum02			-1.640 ***
			1.402
k(-1)dum02		-1.359	
			1.286
dum02it(after)		-0.960 ***	-1.026
		0.344	0.341
dum02nnit		-0.121	-0.119
		0.140	0.140
R^2	0.640	0.631	0.635

Notes: Dependent variable: yearly inflation. Regressions include constant and country FE and infl(-1), deficit/gdp, trade, curdur(-1) and time trend. Robust s.e. are reported in brackets.

Table 9: **DID Panel Data, sample 1985-2003**

	(1)	(2)	(3)
k0	-0.234	-0.304	-0.216
	0.534	0.529	0.514
k1	-1.521 ***	-1.431 ***	-1.331 ***
	0.509	0.550	0.533
k2	-0.387	-0.441	-0.355
	0.553	0.588	0.561
k3	-1.306 ***	-1.271 ***	-1.216 ***
	0.432	0.473	0.436
k>3	-0.698 *	-0.804 **	-0.818 **
	0.405	0.408	0.393
dummy02	-0.514 ***		
	0.154		
dum02it(before)		-1.262 **	
		0.541	
k(-2)dum02			-2.283 **
			1.169
k(-1)dum02			-2.112 *
			1.265
dum02it(after)		-0.980 ***	-1.066 ***
		0.351	0.353
dum02nnit		-0.123	-0.140
		0.142	0.140
R^2	0.625	0.618	0.644

Notes: Dependent variable: yearly inflation. Regressions include constant and country FE and infl(-1), deficit/gdp, trade, curdur(-1) and time trend. Robust s.e. are reported in brackets.