Trend Inflation, Wage Indexation, and Determinacy in the U.S.*

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Abstract

We combine an estimated monetary policy rule for the U.S. economy featuring time-varying trend inflation and stochastic coefficients with a plausibly calibrated medium scale new-Keynesian framework embedding positive trend inflation. Contrary to Coibion and Gorodnichenko (2011a), we find that the impact of the decline in trend inflation on the likelihood of being in a determinate state is modest and limited to the second part of the 1970s. In line with Clarida, Galí, and Gertler (2000), a change in the policy parameters is shown to be sufficient to drive the economy to a unique equilibrium all else being equal. We identify wage indexation as the key-element supporting our "Taylor parameter only" story reading of the switch to determinacy.

*JEL classification: C22, E3, E43, E5.*

*Keywords:* Policy Rules, Trend Inflation, Great Moderation, Determinacy, Disinflation.

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1 Introduction

One of the most popular stories researchers tell to explain the U.S. Great Moderation regards the change in the Federal Reserve’s systematic monetary policy. Monetary policy became more aggressive at the end of the 1970s and managed to drive the U.S. economy on a low volatility-path, at least until the recent financial crises.\footnote{The main alternative to this story emphasizes the change in volatility of the U.S. macroeconomic shocks. See, among others, Sims and Zha (2006) and Justiniano and Primiceri (2008).} Clarida, Galí, and Gertler (2000) estimate a variety of simple policy rules and show that a dramatic increase in the systematic policy reaction to inflation fluctuations can be associated with the advent of Paul Volcker as Federal Reserve’s chairman. A list of contributions, including Lubik and Schorfheide (2004), Boivin and Giannoni (2006), and Benati and Surico (2009) consolidate this finding.

A recent paper by Coibion and Gorodnichenko (2011a) (CG henceforth) intriguingly elaborates on this story. CG show that a positive inflation target (also known as "trend inflation") restricts the region of determinacy of the rational expectation equilibrium in a standard New Keynesian model.\footnote{For related contributions, see Hornstein and Wolman (2005), Kiley (2007), Ascari and Ropele (2009).} The Taylor principle per se does not guarantee a determinate equilibrium: the higher is trend inflation, the more aggressive must be the policy reaction to inflation to guarantee determinacy. CG estimate a monetary policy rule featuring both time-varying policy coefficients and time-varying trend inflation, which is interpreted as the Federal Reserve’s inflation target. By feeding the estimated processes for the policy coefficients and trend inflation...
tion into a microfounded small scale AS/AD model, they show that the U.S. economy switched to determinacy during the Volcker disinflation because of both the change in the Fed’s response to macroeconomic variables and a marked decline in trend inflation. CG show that this second element, often overlooked in the debate on the drivers of the Great Moderation, is actually necessary to obtain a unique equilibrium in a plausibly calibrated small scale framework for the U.S. economy.

From a policy standpoint, CG’s message is very powerful. If low trend inflation is fundamental to pin down a unique equilibrium and to get rid of inefficient fluctuations, policymakers should refrain from raising it. This policy implication is interesting, because it relates to some recent considerations put forward by Blanchard, Dell’Ariccia, and Mauro (2010) on the need to seriously assess the pros and cons of an increase of the inflation target to four percent, which would leave more room for monetary policy easings to face economic downturns before hitting the zero lower bound. Indeed, CG’s result is a warning to be taken seriously.

This paper tests the role played by trend inflation as a driver of the Great Moderation. We combine the policy rule estimated by CG with a plausibly calibrated operational medium scale model à la Christiano, Eichenbaum, and Evans (2005). Medium scale frameworks like those popularized by Schmitt-Grohe and Uribe (2004), Christiano, Eichenbaum, and Evans (2005), and Smets and Wouters (2007) have been widely adopted by research centers and academic circles for the last ten years or so. Therefore, they offer a natural ground to analyze and disentangle the role possibly played by monetary policy and trend inflation in switching the economy to the Great Moderation.
We then conduct a battery of counterfactual exercises to identify the influence exerted by trend inflation on the likelihood of being in a determinate state.

Our main finding gives robust support to changes in the systematic monetary policy as a factor possibly sufficient to explain the conquest of U.S. Great Moderation. Differently, trend inflation is shown to exert just a modest influence on the likelihood of falling in the indeterminacy territory. This influence is confined to the last years of the 1970s, a phase in which trend inflation reached its historical peak in the post-WWII sample. Consequently, the "Taylor parameter only" story popularized by Clarida, Galí, and Gertler (2000) re-emerges as the main driver (between the two we focus on in this study) that may have led the U.S. economy to enjoy more than two decades of relatively stable macroeconomic conditions.

Importantly, our result is shown to depend upon the degree of wage indexation we allow in the model. Wage indexation counteracts the negative effects of trend inflation on the width of the determinacy region. We find that CG’s story holds true for low values of wage indexation. The empirical literature, however, has proposed a wide variety of values, ranging from the very high calibration in Christiano, Eichenbaum, and Evans (2005) to the low point estimates by Justiniano and Primiceri (2008). We provide fresh empirical evidence by estimating a reduced-form linear model linking wage and price inflation, from which we back out the corresponding degree of wage indexation. We show that wage indexation is clearly unstable over time, i.e. it is high and significant in the 1970s, but dramatically drops to zero conditional on the Great Moderation sample. Similar evidence is pro-
vided in a recent work by Hofmann, Peersman, and Straub (2010), who work with a VAR framework embedding time-varying coefficients. This change in wage indexation correlates with the variation in the policy coefficients originally detected by Clarida, Galí, and Gertler (2000) and lastly documented by Coibion and Gorodnichenko (2011a,b). Then, the effects of high realizations of trend inflation are likely to have been dampened by wage indexation in the 1970s. More generally, our findings call for a deeper understanding of the interaction between monetary policy and labor market frictions, and they offer support to studies investigating this issue.

Our paper is structured as follows. [...]
where

$$c_t = (1 - \rho_{1,t} - \rho_{2,t})[(1 - \phi_{\pi,t})\pi_t + \omega_t - \phi_{yy,t}y_t - \phi_{x,t}x_t] \tag{2}$$

Eq. (1) describes the policy rate $r_t$ as responding to a time varying intercept $c_t$, to expected inflation over the next two quarters $E_t\pi_{t+2}$, to expected output growth $E_tg_t$ and expected output gap $E_t\varepsilon_t$ in the current quarter. Following Coibion and Gorodnichenko (2011a) and Coibion and Gorodnichenko (2011b), we allow for two lags of the policy rate to achieve a better empirical fit of the observed policy rate dynamics. In contrast, the policy shock $\varepsilon_t$ is assumed to be Gaussian. As in Boivin (2006), Coibion and Gorodnichenko (2011 a,b) policy parameters are assumed to follow random walk processes. Greenbook forecasts of current and future macroeconomic variables prepared by staff members of the Federal Reserve are employed in the estimation. To replicate CG’s results, we stick to their sample choice, i.e. March 1969-December 2002.3

Coibion and Gorodnichenko (2011a) and Coibion and Gorodnichenko (2011b) find compelling evidence in favor of changes changes in the policy coefficients. In particular, after 1982 the policy rule features an increase in the response to inflation and to output growth, and also in the overall degree of interest rate smoothing. The estimated trend inflation process also

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3The evolution of the coefficients and processes in equations (1) and (2) is estimated via the Kalman smoother. Two breaks in the volatility of shocks to the parameters are modeled, one in 1979 and the other one in 1982. A detailed description of the data employed in this analysis may be found in Coibion and Gorodnichenko (2011a). The measure of time-varying trend inflation is extracted from the time varying constant (2) conditional on some additional assumptions on the equilibrium real interest rate and the Federal Reserve’s targets for real GDP growth and the output gap. Such targets are approximated by computing the trend measures of the observables via the Hodrick-Prescott filter (smoothing weight: 1,600), which we then feed into (2) along with the estimated time-varying parameters, to extract the trend inflation measure.
displays substantial variations over time. In particular, it starts from a value close to three percent in 1969, then it gradually increases until the end of the 1970s, where it reaches values close to eight percent. Then, a substantial drop occurs during the Volcker disinflation, and a continuous decline towards two percent follows.

We then combine this estimated policy rule with a medium scale model à la ?; Christiano, Eichenbaum, and Evans (2005), Smets and Wouters (2007), to which we refer for details on the derivation. In a nutshell, this framework is a dynamic stochastic general equilibrium model featuring a variety of real and nominal frictions. The former are monopolistic competition, habit persistence in consumption, fixed cost in an otherwise standard Cobb-Douglas production function, variable capacity utilization and adjustment costs in investment. Money is introduced into the model via real balances in the utility function and a cash-in-advance constraint on wage payments of firms. Wages and prices are sticky à la Calvo-Yun and they are indexed to past inflation.

In terms of calibration, the degree of price indexation is set to zero as in CG for comparability reasons. The rest of the parameters are calibrated by exploiting Christiano et al’s (2005) baseline calibration/estimates, which we report in Table 1. We now turn to our counterfactual simulations.

2.2 Counterfactual exercises

We engage in three different counterfactual exercises. The first one, which closely follows CG, tackles the following question:

What is the impact of trend inflation on the probability of determinacy conditional on an estimated time-varying policy rule?
We consider three different cases. The first one features a fixed inflation target set at six percent (roughly the average inflation rate in the pre-Volcker period). The second one features a fixed inflation target calibrated at three percent (roughly the average inflation rate during the Great Moderation). The third case considers the time-varying trend inflation consistent with the estimated policy rule (1)-(2). This last exercise aims at assessing the relevance of the changes in the low frequency component of the inflation process. Compelling evidence in favor of such changes has been offered by Ireland (2007), Cogley and Sbordone (2008), and Cogley, Primiceri, and Sargent (2010).

Our goal is to compute the probability of determinacy per each quarter of the sample. Figure 1 depicts the outcome of our computations.⁴ To interpret the Figure, it is important to recall that the evolution of such probability over time depends on the time-dependence of the monetary policy coefficients and, when present, that of trend inflation. Moreover, all three analyzed scenarios share the same evolution of the policy coefficients. Therefore, differences among the probabilities, if present, must be driven by differences in the three inflation processes. Hence, the larger is the impact exerted by trend inflation on the computed probabilities, the larger should be the differences among the three lines displayed in Figure 1.

⁴Such probabilities are computed as follows. We draw a single realization from the estimated distributions of each single policy coefficient per each given period. Conditional on that, per each given period we check if the economy features a unique rational expectations equilibrium. We repeat this exercise 10,000 times, and compute the time-dependent probability of being in a determinate state as the ratio between the number of times we verified the equilibrium is unique and the total number of draws.
A wealth of indications arise. Trend inflation affects the probability of determinacy in the 1975-1980 sample only. In presence of high trend inflation rates (the case in which trend inflation fixed at six percent, or the case in which the time-varying trend inflation hits its historical highs), the probability of being a determinate state is low. However, this occurs when, on top of having high trend inflation rates, the economy features a relatively weak policy reaction to inflation and the output growth. Differently, trend inflation plays a negligible role in the rest of the post-WWII sample. In particular, it exerts a virtually zero-impact as for the Great Moderation period, during which the probability of being a state of determinacy is de facto independent from trend inflation and exclusively driven by the evolution of the policy coefficients (as for the drivers considered in this analysis).

We conclude that the impact of trend inflation is just limited to the second half of the 1970s, in which realized and trend inflation hit their historical highs and monetary policy weakly reacted to inflation and output growth. Differently with respect to CG, who condition their analysis on a (possibly misspecified) small scale model, we find that the impact of trend inflation on the probability of being in a determinate state is negligible at best in the rest of the sample.

2.3 Role of trend inflation with fixed policy responses

The previous analysis allows for monetary policy and trend inflation to change jointly, as in CG. To disentangle the role of trend inflation alone, however, it is more insightful to analyze the effect of time-varying trend inflation on determinacy conditional on a fixed monetary policy. In this Section
we thus ask the following question:

Suppose to counterfactually fix the monetary policy coefficients and to allow for variations in trend inflation only: Would we observe any changes in the probability of being in a determinate state?

A positive answer would corroborate the role assigned to trend inflation as a possible driver of the Great Moderation.

We then set up the following exercise. We move from our rule with time-varying coefficients to rules featuring fixed policy coefficients $x_t = x, x_t = [\phi_{\pi,t}, \phi_{xx,t}, \phi_{x_t}, \phi_{1,t}, \phi_{2,t}]'. We calibrate such rules with the pre 1979 vs. post 1982 point estimates obtained by CG (see their Table 1, under "Mixed Taylor rule"). We then couple the Christiano, Eichenbaum, and Evans (2005) model with either estimated policy rules. To assess the impact of trend inflation, we consider the estimated time-varying trend inflation process $\pi_t$.

Figure 2 depicts our computed probabilities. Intriguingly, drastic differences arise among the different scenarios we analyze. The one associated to the pre-1979 policy assumes an average value of about 0.30. A striking different result emerges when considering the more aggressive post-1982 policy rule, which returns a value slightly above 0.70 on average, fairly low volatile over time. The effect of trend inflation is marginally visible in (and confined to) the second half of the 1970s and the early 1980s. Overall, however, the impact of the time-varying inflation process is negligible.

Our findings reveal the following. Had the Fed maintained a constantly weak monetary policy in the pre-1979 sample, and had it switched to a con-
stantly aggressive monetary policy in the post-1979 phase, we would have registered a switch from a state of indeterminacy to a state of uniqueness for whatever value of trend inflation (in the range of its historical realizations). Hence, our results offer solid support to the role played by systematic monetary policy in anchoring inflation expectations, a result corroborating those put forward by Clarida, Galí, and Gertler (2000).

2.4 Role of the Taylor parameter

Finally, we want to assess the importance of the Fed’s response to inflation only. Clarida, Galí, and Gertler (2000), view the weak monetary policy response to inflation as the main driver of the Great Inflation period, causing indeterminacy of the rational expectations equilibria, disanchored inflation expectations, and - consequently - realized inflation. We thus run counterfactual experiments to assess the role of the Fed’s response to inflation in inducing determinacy in an environment that admits time-varying trend inflation. The precise question in this Section is:

*Would the shift in the Fed’s response to inflation only be sufficient to insure determinacy regardless of trend inflation?*

To answer this question, we look at how the probabilities of determinacy are affected by counterfactually fixing all the monetary policy coefficients and then switching from one sub-period to the other *just* the response to inflation, accordingly to Table 1 in CG. Besides, we allow both for time varying trend inflation and for fix levels (3% and 6%) of trend inflation. Figure 3 (top-left panel) clearly shows that a shift in $\phi_n$ is sufficient to determine the switch from a low probability of determinacy in the Great Inflation period to
a high probability of determinacy in the Great Moderation period. Clarida, Galí, and Gertler (2000) is simply restored. Interestingly enough, the Taylor parameter turns out to be the only one substantially influencing the probability of being in a determinate state. Perturbations of the remaining policy coefficients imply much milder changes of such probabilities.

3 Investigating the mechanism

The medium-scale model includes a number of features that are not present in the baseline new-Keynesian framework employed by CG in their analysis. One may then wonder which friction, or set of frictions, is responsible for the discrepancy between CG’s and ours results. We extensively scrutinized the role of each extra nominal and real friction in the model at work, and verified that there is a single ingredient very important our result: wage indexation.

3.1 The role of wage indexation

Wage indexation has been subject of an intense empirical scrutiny in recent years. In conducting estimations based on indirect inference of the model we focus on in this paper, Christiano, Eichenbaum, and Evans (2005) calibrate it to one. Smets and Wouters (2007) estimate a similar model with Bayesian techniques and find a posterior mode of 0.58 for such a parameter. Rabanal and Rubio-Ramírez (2005) obtain a posterior mean equal to 0.25 conditional on a smaller scale model estimated with Bayesian techniques. Justiniano and Primiceri (2008) estimate a value very close to zero with a flexible medium scale framework allowing for time-varying volatilities of the macroeconomic shocks. It is, then, somewhat natural to study different scenarios character-
ized by heterogeneous degrees of indexation.

Figure 4 displays the probability of being in a determinate state (conditional on fixed policies, as in Section ??) in presence of different degrees of wage indexation. Evidently, the degree of wage indexation is key for our result.\(^5\) Our baseline calibration, which is the one in Christiano, Eichenbaum, and Evans (2005), clearly points toward systematic monetary policy as the only driver of the Great Moderation. Our results holds true for a variety of calibrations of the indexation parameter. When reducing wage indexation to 0.58, the "Taylor parameter only" story is still supported by our simulations. The impact of trend inflation is minor and just limited to the period 1977-1983, in which the low frequency component of inflation recorded its highest values in the investigated sample. The probability of being in a determinate state remains above 0.5 no matter what the value taken by trend inflation is (among those consistent with historical realizations). A drastically different result is obtained when calibrating the degree of wage indexation to 0.25. In that case, trend inflation dramatically reduces the probability of being in a determinate state. This last finding is \textit{a fortiori} supported by the analysis undertaken with zero wage indexation. Interestingly, trend inflation does not seem to affect the probability of determinacy associated to a weak systematic policy conduct. Even more surprisingly, for very low values of wage indexation, the aggressive post 1982 policy induces a lower probability of being in a determinate state than the weaker pre 1979 policy. This result may be a

\(^{5}\)Note that this would also be true for price indexation, as already noted by CG. However, to compare our results with CG, we stick with their baseline assumption of no indexation in prices. Since CG assume a competitive labor market and flexible wages, they obviously do not analyze the role wage indexation.
sign of some misbehavior of the model in the case of no indexation in wages and prices and high trend inflation (see Ascari, 2004).

The interaction between indexation and trend inflation on the determinacy regions in a New Keynesian model has been investigated by Ascari and Ropele (2007) and Coibion and Gorodnichenko (2011a). Indexation counteracts the effects of trend inflation on the model dynamics. **[Guido, Nick: we need some intuition here]** At the limit, in presence of full indexation (either on prices, or on wages, or both), the effects of trend inflation on the dynamics of the model are just muted. **However, as shown in Ascari (2004), partial indexation has some unpalatable long-run effects that are the source of the effects on the dynamics of the model and then also on the indeterminacy regions (see Ascari and Ropele, 2007).** **[obscure: Guido, please rephrase it]**

To summarize, in presence of high wage indexation, the effect played by trend inflation is small. Consequently, changes in systematic policy are sufficient to engineer a switch to an unique rational expectations equilibrium in a medium scale macroeconomic model. In presence of a low level of indexation, trend inflation gains power and importantly affects the determinacy region, a finding already stressed by CG. Our results suggest that the interaction between monetary policy and wage indexation is key for a correct understanding of the evolution of the U.S. macroeconomic dynamics. We provide novel evidence on wage indexation in the next sub-Section.
3.2 Wage indexation: Empirical evidence

We estimate the degree of wage indexation taking to the U.S. data the following empirical model:

\[ \pi_t^w = c + \sum_{j=1}^{J} \gamma_j^w \pi_{t-j}^w + \sum_{k=1}^{K} \gamma_k^\pi \pi_{t-k} + \varepsilon_t^w, \] (3)

where \( \pi_t^w \) is wage inflation, and \( \pi_t \) stands for price inflation.\(^6\) Lags in eq. (3) capture the wage inflation persistence in a reduced form fashion. Following Hofmann, Peersman, and Straub (2010), the degree of wage indexation is defined as follows:

\[ WI = \frac{\sum_{k=1}^{K} \gamma_k^\pi}{1 - \sum_{j=1}^{J} \gamma_j^w}. \] (4)

We then estimate equation (3), which allows us to recover the elements characterizing the estimated degree of wage indexation. The uncertainty surrounding the estimation of the degree of wage indexation is assessed via bootstrapping.\(^7\) We line up again with CG and select two different subsamples: 1969:I-1979:II and 1983:I-2002:IV.

\(^6\)Inflation rates computed by considering the quarterly growth rate of nominal wages (hourly compensation in the non-farm business sector) and the GDP price deflator, respectively.

\(^7\)We set \( J = 3 \) as minimum number of lags to get rid of the serial correlation as detected by the Breusch-Godfrey serial correlation LM test at a 5% confidence level. A search for the significant lagged price inflation regressors led us to set \( K = 1 \). We implemented our bootstrapping as follows. First, we estimated eq. (3) with OLS. Second, we fixed the parameter values of the regressors of eq. (3) to their OLS estimates, and we generated pseudo-data for wage inflation by sampling with replacement a number of realizations out of the vector of residuals estimated at the first round. Third, we employed these pseudo-data to estimate eq. (3) with OLS, we computed the wage index (3), and we stored it. We repeated steps two and three a number of times equal to 10,000 for each of the two subsamples we focus on.
Figure 5 displays the two estimated densities. The striking difference between the two distributions of degree of wage indexation is immediately visible. The mean value of the degree of wage indexation estimated for the 1969-1979 sample is 0.56, with a 95% confidence interval reading [0.38, 0.74]. In synthesis, the estimated degree of wage indexation is high and precisely estimated in the Great Inflation sample. However, this parameter is clearly unstable over time. In fact, when turning to the 1983-2002 sample, we find it to be statistically insignificant, with a mean value −0.25 being surrounded by the huge uncertainty captured by its 95% confidence interval, which reads [−1.00, 0.54]. Our results are in line with those proposed in a recent empirical paper by Hofmann, Peersman, and Straub (2010), who work with a time-varying VAR estimated with U.S. data and find wage indexation to be possibly regime-specific.

Our empirical findings lead us to conclude the following. The effect that the high trend inflation rate of the 1970s could potentially have played was in fact substantially dampened by a high degree of wage indexation. Such indexation dramatically dropped in the 1980s and 1990s, but trend inflation fell as well. Overall, the impact of trend inflation in a plausibly calibrated medium scale model is likely to be mild at best. However, our analysis calls for further empirical work to investigate the presence and variation of wage indexation over time and its interaction (possibly, dependence) with the policy regime in place.
4 Conclusions

We combine an estimated monetary policy rule featuring time-varying trend inflation and stochastic coefficients with the medium scale model popularized by Christiano, Eichenbaum, and Evans (2005), which we calibrate with their estimates. We conduct a variety of counterfactual experiments to isolate influence of trend inflation on the likelihood of being in a determinate state. We show that even with positive trend inflation, the Taylor principle is sufficient to guarantee a determinate equilibrium in a world described by a medium scale model as (or close to) the one adopted by most central banks nowadays. In other words, trend inflation does not seem to play a relevant role in determining the probability of being in an indeterminate region. Our results differ from those proposed by Coibion and Gorodnichenko (2011a), who indicate the reduction in trend inflation as a necessary ingredient for the switch to a more moderate macroeconomic environment. From a policy standpoint, we believe that the Blanchard, Dell’Ariccia, and Mauro (2010) proposal of raising the inflation target to four percent to avoid hitting the zero-lower bound during economic downturns should not necessarily discarded as likely to drive the U.S. economy "back to the 1970s". However, in light of the risks associated to such proposal, more research is needed in order to understand if such a choice would actually be optimal from a welfare standpoint. Interesting research along this dimension has recently been proposed by Coibion, Gorodnichenko, and Wieland (2010).

We find that wage indexation is the key element opening the gap between our results and CG’s. A high degree of wage indexation dampens the role
played by trend inflation and, consequently, reinforces the one assigned to systematic monetary policy. We provide novel empirical evidence pointing to the wage indexation parameter as being unstable over time. In particular, we find a negative correlation between the degree of wage indexation and the monetary policy aggressiveness against inflation fluctuations. Given our limited understanding of the wage indexation mechanism at a macroeconomic level, our results suggest that future research should aim to endogenize the wage indexation mechanism and to understand its determinants. While important work has been done studying the interaction between monetary policy and the labor market (e.g., Krause and Lubik, 2007, Gertler and Trigari, 2009 , Blanchard and Gali, 2010), this paper provides support for a precise direction in this field of research.

References


----- (2011b): “Why are target interest rate changes so persistent?,” College of William and Mary and University of California at Berkeley, mimeo.


Figure 1: **Probability of Determinacy using an Estimated Time-Varying Response Function by the Federal Reserve.** The figure depicts the probability of determinacy implied by the distribution of time-varying parameters estimated as described in the text (see Section X.Y). The dashed (dotted) blue line assumes a constant rate of trend inflation of 3 percent (6 percent). The solid black line accounts for the time-varying measure of trend inflation computed as described in the text (Section ??).
Figure 2: Probability of Determinacy using Estimated Fixed Policy Responses by the Federal Reserve. The figure depicts the probability of determinacy implied by the estimated fixed coefficient-policy rules as in Coibion-Gorodnichenko (2010), Table 1, mixed Taylor Rule. The volatility of the computed probability is driven by the time-varying trend inflation computed as described in the text (see Section X.Y). The dashed blue line considers a weak monetary policy. The solid black line takes an aggressive monetary policy into account.
Figure 3: Probability of Determinacy: The role of policy coefficients. Time varying trend inflation employed in our simulations.
Figure 5: Probability of Determinacy using Estimated Fixed Policy Responses by the Federal Reserve. Various Degrees of Indexation.
Figure 3: **Estimated Degree of Wage Indexation: Pre 1979 and Post 1982 Densities.** Densities bootstrapped by taking as a reference framework an AR(3) model for wage inflation augmented with a lagged observation of price inflation. Mean values indicated with vertical bars.
5 Tables

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