The politics of price stability: the role of social transfers on monetary management

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Abstract

This paper argues that the ability of governments to credibly commit to price stability largely depends on the level of social, employment and unemployment insurance. A model is developed where price stability is a public good with asymmetric costs and benefits. The stable provision of price stability can be achieved by compensating the losers of disinflation in the form of social insurance. Empirical evidence from 18 OECD countries supports the argument that social insurance has a substantial disinflationary role. Moreover, social insurance increases the disinflationary role of central bank independence and alleviates the inflationary effect of income inequality.

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1. Introduction

The nineties have been characterized as the decade of low inflation. Kenneth Rogoff, in a recent paper notes about global inflation "Over the past ten years, global inflation has dropped from 30% to 4%. Without question, a large part of this breathtaking drop in inflation has to be attributed to improved central bank institutions and practice" (p2, 2003). This statement does not come as a surprise to either policy makers or economists. Since Barro and Gordon's 1983 article which attributed inflation to time inconsistent monetary policy, central bank independence has featured in innumerable theoretical and empirical papers studying inflation[1]. Should one conclude that inflation is a problem of the past thanks to its depoliticization by independent central banks? To what extent can economic outcomes such as inflation be depoliticized, especially when they benefit some social groups at the expense of others? This paper is in line with recent research (eg Franzese, 1999; Keefer and Stasavage, 2003) which raises doubts about the sufficiency of the easy fix of central bank independence for long term price stability and it draws attention back to the social determinants of inflation and more specifically to income distribution and to social insurance.

[1] For an excellent review on the theoretical and empirical research on inflation and on the role of central bank independence in the economics discipline, see Berger, de Haan and Eijffinger, 2001.

While income distribution has recently drawn the attention of researchers as an important determinant of inflation due to the redistributional nature of inflation from savers to borrowers (Edmond, 2002, Desai, Olofsgard and Yousef, 2003, Dolmas, Huffman and Wynne, 2000, Beetsma and Van der Ploeg, 1996), social security has not been explicitly associated with inflation. The large-n country corporatist literature on inflation has also underplayed the political bargaining involving welfare concessions from the governments towards the trade unions, and it has focused, instead, on the disinflationary and employment maximizing role of wage restraint through coordinated wage bargaining (Calmfors and Driffill, 1988; Iversen, 1998, 1999). With the exception of Mares (2004) who explicitly studies the role of social transfers on employment, evidence of such bargaining taking place in the form of tripartite national agreements or in the form of social pacts is limited to country based research (Jones, 2003; Rhodes and Hancke, 2005). The fact that neither the literature studying income distribution nor the literature on wage bargaining has paid enough attention to the compensatory mechanism of wage bargaining leaves us with little understanding of the re-distributionary nature of disinflation[2] and its political implications. The contention of this paper is that the level of social insurance has been a determining factor of disinflation during the last three decades.

The literature, in general, has not considered the alleviating role of social insurance on the distributional consequences of disinflation. Moreover, the literature has not

[2] According to the MIT Dictionary of Modern Economics (1992), disinflation occurs when the inflation rate is positive but declining while deflation is defined as the sustained fall in the general price level. I use the term disinflation to refer to the deliberate governmental policy which aims at reducing inflation through the means of contractionary monetary policies, and more specifically through increasing the real interest rate (Burda and Wyplosz, p343).

considered the role employment and unemployment insurance on disinflation although disinflation has real short term economic effects. The existence of the short term augmented Philips[3] curve in contemporary economies (Sorensen and Whitta-Jacobsen, 2005, p538-542; Bakhshi, Khan and Rudolfy, 2004) means that disinflation has real employment costs, at least in the short term. In the OECD countries, it is likely that inflation is used as a means to absorb various supply and cost-push shocks rather than as a means of taxation on the households' savings.

This paper draws attention to the role of social, unemployment and employment insurance on the ability of governments to keep high price stability. Starting from the cornerstone assumption that disinflation has real short term employment and distributional costs it is argued that the policy of price stability should not be treated differently from other macro-economic policies which involve high employment risks such as de-industrialization and trade openness. In the same way that social actors demand compensation when they face the risks of increasing unemployment due to de-industrialization (Iversen and Cusack, 2000) or due to exposure to international trade (Mares, 2005; Rodrik, 1998; Cameron, 1978), voters demand compensation when they face the risk of increasing unemployment due to disinflation.

It is argued that inflation is not an outcome of political monetary manipulation but of the failure of the government to pay for the costs of disinflation. Since price stability is a public good, its supply depends on the governments' ability to finance it as well as on the

[3] A number of newer type Philips Curves have been identified in the literature, such as the New Keynesian Philips Curve and the State Dependent Philips Curve which estimate inflation on inflation expectations, the level of economic activity (and sometimes past inflation and the price setting behaviour of firms) (Bakhshi, Khan and Rudolfy, 2004)

voters' willingness to pay for it. The voters' preference over price stability is a function of their income sources. The more savings they have and the less they rely on their wage for their private consumption, the higher utility they derive from price stability. On the other hand, the more they rely on their wage for their private consumption and the more likely they are to get unemployed, the higher is their disutility from price stability. According to the theory of public goods, the governments should tax those who have the highest benefit from price stability and compensate those who have the least benefit. In the presence of social transfers, the public good will be optimally provided and thus will be politically sustainable (Lindhal, 1994).

The next section presents a stylized theoretical model where a condition of the optimal supply of price stability is identified when two heterogeneous households with different sources of income contribute for its supply. Section three discusses the contribution of the theoretical proposition in the literature and further empirical implications are derived with respect to central bank independence and income inequality. In the last section the data, estimation and the empirical results are discussed.

2. An alternative theory of price stability: Price stability as a public good

Price stability is a public good which households have to pay for. A public good is a good that is non-rival, which means that consumption by one household does not preclude consumption by another household, and it is non-excludable, which means that none can

be prevented from consuming the good. It is true that price stability is a public good because it is both non-rival and non-excludable.

Public goods are usually provided with the scope of increasing social welfare and electoral votes. Price stability increases social welfare since it increases confidence in the economic and financial system, leading to higher savings and investment levels. However, the production cost of the public good might exceed its average social (and perhaps political) benefit, in which case the good will be underprovided. Like all public goods, price stability has production costs. These costs are the real short term economic costs in terms of output and employment during phases of disinflation. When those affected adversely by disinflation have not got political clout, or are not aware of the negative employment effects of disinflation, the supply of price stability does not become a political issue. However, when the losers of disinflations have political voice the government might be pressured to revise its monetary policy. Alternatively, the government might choose to alleviate the negative effects of disinflation by providing compensation in the form of social insurance to those who bear the highest welfare loss.

The theory of public goods informs us that taxing those who benefit most and compensating the losers is a sufficient condition for the stable supply of a public good. This can be done by setting a price for each household to pay for the public good according to the household's utility of the good, known as Lindhal prices (Laffont,1988, p41; Varian, 1994, p425). This price should reflect the household's marginal utility of the public good in relation to its marginal utility of the private good it consumes, known as

the household's Marginal Rate of Substitution (MRS).

In reality there are no such prices for 'buying' more or less price stability and voters are not asked to contribute for its production, like they might be asked to contribute for the construction of a new hospital, for example. Yet, the government could estimate the MRS of the different households with respect to inflation according to their income sources. Assuming that price stability is financed by the private contributions of the household, the necessary and sufficient condition for the efficient supply of price stability is that the sum of marginal rates of substitution adds to one (Varian, 1994, p419). If there are only two households, one poor and one rich in the society, the following condition must be met $MRS_p + MRS_r = 1$ (or $\frac{\frac{\partial u_p}{\partial \xi}}{\frac{\partial u_p}{\partial x_p}} + \frac{\frac{\partial u_r}{\partial \xi}}{\frac{\partial u_r}{\partial x_r}} = 1$), where u_i is the utility of the household i, ξ is the public good and x_i is the private good of household i. This condition for Pareto-optimality says that if the sum of marginal rates of substitution is less than one, then both groups would be better off if they had less of that good.

In order to see why the sum of contributions might be less than one, leading to higher inflation, it is important to understand how the differences in income sources and distribution affect the utility of disinflations. Some households are rich enough to live on their savings and need not work while other, poorer households rely solely on their wage. As a consequence, the poorer households are more likely to suffer the consequences of disinflation through the increased risk of unemployment. Although unexpected inflation hurts everyone, its negative impact is higher for those with savings than for those who

only consume their salaries. On the other hand, while the negative impact on economic growth caused by disinflations affects both rich and poor, the less skilled who are more likely to become unemployed during economic downturns are those to be primarily disaffected (Acemoglu, 2002, p75, Bover, Bentolila, Arellano, 2002, p15, Sheldon, 2002, p224)[4]. Thus voters derive the costs and benefits of price stability (=disinflation)[5] and decide whether or not to support price stability with their vote. Their decision then will be a function of the sources of income available to them, both private and public.

I proceed to estimate the sufficient condition for the efficient provision of price stability, under the aforementioned assumptions.

Households have a Cobb-Douglas utility function:

$$u_i = x_i^{\alpha}\left(\xi\right)^{1-\alpha} \qquad (1)$$

where i is rich or poor and a fraction ρ are rich, where $\alpha \in [0,1]$, x is the private good and $\xi = \Delta\pi = \pi^e - \pi$ is the public good, defined here as disinflation[6] rather than as price

[4] Between 1992 and 1994 the unemployment rate in the USA for men with less than 4 years of high school was at 13.9 percent, while those will college degrees was 3.2 per cent (Acemoglu, 2002, p75). Generally, "the risk and duration of unemployment are inversely related to skill levels" in all OECD countries (Sheldon, 2002, p224) although, since the late nineties, job insecurity has increased in some high-paid sectors as well, especially in the financial and construction sectors (Burchell, 2002, p65-68).

[5] Price stability is not the same as disinflation, since the first refers to the variance in inflation, whereas the second is the negative change in inflation. I use the term price stability as a more general term since it is an outcome whereas disinflation is a policy with which price stability is achieved when supply monetary shocks occur.

[6] This expression derives from the Phillips curve where the natural rate of unemployment is zero, $U = -(\pi - \pi^e) + \epsilon_t$

where π is the actual inflation and π^e is expected inflation. When the realised inflation is higher than the expected, unemployment decreases, and thus the minus sign in front of the

stability.

Both the private and public goods are normal goods and the households have convex preferences over the two goods (they prefer to have both rather than just one). The production technology of the public good is one of decreasing returns ($\xi' > 0$, $\xi'' < 0$) and it is based on positive input of the private good (we cannot produce price stability without disinflating, or else without certain sacrifice of the private good).

The budget constraint is different for the rich and for the poor people. For simplicity we assume that rich people do not work and base their consumption x_r only on their on their savings S, so that $S = x_r$

Given that the rich do not work, price stability can only increase or decrease their savings by a fraction $s\Delta\pi$ (which will be denoted as a fraction $s\xi$). When $\Delta\pi$ increases, the real value of their savings increases while when $\Delta\pi$ decreases the real value of their savings decreases. So, the budget constraint for the rich household is: $x_r = s - s\xi$

Its optimization problem with respect to its private good and inflation is the following:

$$\max: U_r = x^a \xi^{1-a} \quad subject\ to \quad x_r = s - s\xi \quad (2)$$

The first order conditions for the maximization of the utility of the rich are:

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brackets (Drazen, 2000, p115). Since I am interested in disinflation, I want to study the case where expected inflation is higher than realised inflation, which increases unemployment, thus I am interested in the case where $(\pi - \pi^e) < 0$ so that $U = (\pi^e - \pi) + \epsilon_t$

$$x_r^* = \alpha s$$

$$\xi^* = 1 - \alpha \qquad (3)$$

The optimization problem for the poor household is the same, but its budget constraint differs: its contribution to the public good is its tolerance to the high risk of unemployment, expressed here as $w\Delta\pi$ (and denoted as $w\xi$). Since wage, w, depends on the rate of unemployment, and since as $\Delta\pi = \xi$ increases the rate of unemployment increases, $w\Delta\pi$ here captures the risk of unemployment multiplied by the level of the wage. Finally, b is any benefit the household receives, such as unemployment benefit and social transfers.

So, the household consumes its salary plus the benefits it receives when it does not have a salary, minus the risk of getting unemployed and losing its salary.

Its budget constraint then is: $x_p = w - w\xi + b$

Its optimization problem is the following:

$$\max U_p = x^{\alpha}\xi^{1-\alpha} \ \textit{subject to} \ x_p = w - w\xi + b \qquad (4)$$

The first order conditions for the maximization of the utility of the poor are

$$x_p^{*p} = \alpha\,(w + b)$$

$$\xi^* = (1 - \alpha)\frac{w + b}{w} \qquad (5)$$

Going back to Samuelson's condition for the efficient provision of the public good, we

can estimate the condition under which price stability will be at the equilibrium.

The condition must satisfy: $MRS_r + MRS_p = 1.$

$$\Rightarrow \frac{\frac{(1-\alpha)}{\xi}}{\frac{\alpha}{x_r}} + \frac{\frac{(1-\alpha)}{\xi}}{\frac{\alpha}{x_p}} = 1$$

which equals to:

$$\frac{x_r + x_p}{\alpha} = \frac{\xi}{1-\alpha} \qquad (6)$$

and by substituting (3) and (5) to (6):

$$\xi = (1-\alpha)(s + w + b)^{7} \qquad (7)$$

Equation (7) gives us the condition for the efficient provision of price stability: the equilibrium level of price stability is a function of the level of savings, wages and social benefits conditioned by the utility of price stability$(1-a)$. This means that the higher the utility of price stability$(1-\alpha)$, the higher will be the fraction of savings, wages and benefits devoted for the provision of price stability. Assuming that $(1-\alpha)$>0, the testable hypothesis that derives from this model is that price stability will be higher, the higher savings, wages and social benefits are.

Hypothesis one*: Price stability is higher in countries with higher social insurance*

[7] This partial equilibrium public goods model illustrates the decision problem households and governments face with respect to the costs and benefits of disinflation on private consumption. A model explaining inflation as a macroeconomic phenomenon would require a general equilibrium model which would include the supply side mechanism of inflation as well.

3. Discussion and contribution of the model in the literature: social insurance, central bank independence and inequality on monetary management

The majority of models on the political economy of inflation have relied on the Philips curve and the tradeoff between inflation and employment. This is true both for the more recent time inconsistency models (Barro and Gordon, 1983) as well as for partisan models (Hibbs, 1977). Inflation is the outcome of time-inconsistency that the social planner faces because it is always profitable to inflate in order to increase employment beyond its natural rate by exploiting the Philips curve (Barro and Gordon, 1983). The loss function[8] of the social planner is the same as the society's and the preferred output for the government is higher than for a conservative central banker whose objective is to keep inflation low in contrast to the elected politician whose policy objective is growth. Thus unless a conservative central banker sets the monetary policy independently from the government, inflation will be higher than is socially optimal (Drazen, 2000, p117-118). A number of papers confirmed the anti-inflationary role of independent central banks (Cukierman, Webb and Neyapti, 1992; Alesina and Summers, 1993) while others have provided alternative socio-economic (Posen, 1993, Campillo and Mirron, 1997, Hall and Franzese, 1998, Iversen, 1998) or political-institutional determinants of inflation (Keefer and Stasavage, 2003).

The proliferation of central bank independence in the nineties is a proof that the theory of

[8] $L = (U - U^*)^2 + a(\pi - \bar{\pi})^2$,as expressed in Barro and Gordon, where a is the weight put on inflation stabilization (1983).

time inconsistency is not only popular in the academic circles but also amongst policy makers and politicians. Most independent central banks today, with the exception of the Federal Reserve, have clear inflation or monetary targets. The European Central Bank's sole mandate is to keep inflation below two percent. However, this does not mean that central banks do not care about the level of unemployment and that the Philips curve does not enter into their policy functions. It is empirically established (Clarida, Gali and Gertler (1998), Eleftheriou, 2003) that most central banks in the industrial advanced economies, including the Federal Reserve and the ECB, follow the Taylor rule[9]. Clarida, Gali and Gertler (1998) find that the two coefficients (which are the weights for price and output stabilization) are "remarkably similar" in a comparative study including the US, Germany, Japan, Italy, France and the UK. It would thus seem unreasonable to ignore the importance of the short term Philips curve when studying the politics of price stability, even in the presence of independent central banks.

Moreover, even if politicians cannot manipulate the monetary tools any longer for their short term political gain, disinflations can have real electoral cost if they lead to unemployment. Thus, central bank independence might be a necessary but not a sufficient condition for price stability. If the argument made in this paper is correct, we would expect to see that social transfers matter even when central bank independence is high. We would even expect to see that central bank independence has a larger

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[9] $i = \bar{r} + \pi + h(\pi - \pi^*) + b(y - \bar{y}), \quad h > 0, \quad b > 0$

where i is the nominal interest rate, r is the real long run equilibrium interest rate, $(\pi - \pi^*)$ is the deviation of real inflation from the inflation target and $(y - \bar{y})$ is the deviation of real output from the target output (Sorensen and Whitta-Jacobsen, 2005, p505-506).

disinflationary effect when there is high social insurance. I test for the role of central bank independence on disinflation, as well as on its effect conditioned by the level of social insurance. Moreover, I test the role of social transfers on price stability both unconditionally and conditionally upon the level of central bank independence. If social transfers have a larger impact on disinflation when central bank independence is higher, then social transfers are not sufficient but are a necessary condition for price stability. On the other hand, if social transfers have a disinflationary effect irrespective of the degree of central bank independence, then social insurance is a sufficient condition for low inflation.

Hypothesis two: *Social insurance is both a sufficient and necessary condition for price stability; in other words, price stability can be achieved with high social insurance independently of the degree of central bank independence and central bank independence is more effective when social insurance is high.*

Finally, we come back to the issue of the inflationary role of income inequality. As already discussed in the introduction the relationship between inflation and income inequality is well established in less economically developed democracies (Desai, Olofsgard and Yousef, 2003). Inflation is a mechanism of redistribution by generating revenues for per- capita transfers using the inflation tax (Desai, Olofsgard and Yousef, 2003, Dolmas, Huffman and Wynne, 2000, Beetsma and Van der Ploeg, 1996). Those who have nominal savings and own public debt are more likely to be inflation averse than those who can only consume their salaries. It is quite unlikely that inflation tax is used in

the OECD countries where the tax and the financial systems are well developed. Still, inflation can hurt savers as long as they do not take action to put their savings into accounts that offer the real interest rate return making the level of nominal holdings a determining factor for the voters' inflationary preferences[10].

Thus, the question is whether social protection suffices for long term price stability in the presence of high income inequality. The simplified theoretical model presented does not deal with the issue of income inequality directly. However, it implies that as long as social benefits are high, income inequality need not matter for price stability because the distributional effects of disinflation are alleviated by increased social insurance. The third hypothesis then is that, price stability is high in the presence of social protection irrespective of the level of income inequality.

Hypothesis three*: Income inequality does not affect price stability in the OECD countries especially in the presence of social transfers*

4. The empirics, estimation and results

4.1 *Data*[11]*: dependent and independent variables*

[10] Kenneth Scheve found a robust relationship between the variation in inflation aversion of individuals and their economic position as nominal asset owners and fixed income wage earners (2003). By using the data from the British Household Panel Survey in 1995, he found a positive and statistically significant effect of the logged nominal assets variable on inflation aversion, and a negative relation with the 'weeks unemployed' variable.

[11]**Data:** I am using the new Comparative Welfare States Data Set, Northwestern University, University of North Carolina, Duke University and Indiana University, by Evelyne Huber, Charles Ragin, John D. Stevens, David Brady, and Jason Beckfield. This dataset includes all the

I test my argument on a dataset that spans from 1970 to 1997. My universe of cases is 18 OECD countries.

The dependent variable is the *change in inflation*. Through out the paper there has been reference to both price stability and disinflation. To remind the reader, price stability, understood as low and stable inflation, involves regular disinflations. We are primarily interested in the effect of social insurance on disinflation, rather than on inflation, since social insurance is expected to be used as a cushion against the short term welfare loss. This is captured by using the change rather than the level of inflation. Secondly, by regressing on the change rather than on the level we can use an error correction model which allows us to estimate the short and long term effects of the variables in question.

The direct empirical implication of the theoretical model is that countries with higher *unemployment benefit* will be better able to keep price stability. Unemployment benefit is the direct private good offered to those afflicted by unemployment due to disinflation. Therefore, unemployment benefit should have a clear negative effect on inflation. However, this is not a sufficient indicator of social insurance for a number of reasons. Firstly, the unemployment benefit measure used is a percentage of social insurance and as such it does not capture the relative generosity of unemployment protection. Secondly, unemployment benefit is only an indicator of social protection against the risk of income

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necessary variables to test my hypotheses on the effect of inequality and social protection on inflation. Also, I have manually collected data from the OECD National Accounts II on financial sector employment and have taken the variables of CBI, union density, national income growth from Rob Franzese's website, available at www-personal.umich.edu/franzese/Publications.htm.

loss. Other transfers in the form of allowances, benefits for sickness, family allowances, grants and early retirement packages (which have been used in many European countries during the late eighties and nineties) are ignored. Therefore we should include the much more inclusive indicator of social security transfers in order to test the role of social insurance on disinflation. Thirdly, the type of unemployment benefit varies dramatically among countries (their generosity, duration, conditions, etc, Atkinson, 1999, Barr, 1992). The quantitative measures of unemployment benefits do not capture all these qualitative differences which might have important effects on the voters' utility. For this reason I also use the variable of *social transfers* (refer to the data appendix for description of the variable) as a form of social insurance which is a more inclusive measure of unemployment insurance than the unemployment benefit.

Finally, some countries tend to have very low unemployment insurance while they have high employment insurance. Japan is the most typical case. Japan has a relative poor welfare state but its large employers offer life employment insurance, covering between 30 and 45 percent of male workers (Bronfenbrenner and Yasuba, 1987, p115). More generally, the Christian democratic welfare states of Continental Europe (Germany, Austria, Italy, France) tend to have high employment insurance while the Scandinavian states tend to have high unemployment insurance, while the liberal Anglo-Saxon states tend to have low employment and unemployment insurance and they rely on means tested transfers (Barr, 1992, Esping-Andersen, 1996). For this reasons, I also use the institutional variable of *employment insurance*. I expect to find a negative and strong correlation between employment insurance and disinflation.

I test the second hypothesis by using an index of *central bank independence*. Since the hypothesis is a conditional one (I test the effectiveness of social insurance conditioned by the level of central bank independence and the effect of central bank independence conditioned by the level of social insurance), I use interactive variables. I estimate the following interactive model[12]

$$change\ in\ inflation = b_1\ social\ insurance + b_2\ CBI + b_3\ social\ insurance \times CBI + X$$

The total effect of social insurance conditioned by central bank independence is:

$\underline{b_1 social\ insurance + b_3 social\ insurance * CBI}$ and the total effect of CBI conditioned by social insurance is: $\underline{b_2 CBI + b_3 social\ insurance * CBI}$.

The third hypothesis on the role of *income inequality* is tested using the logged ratio of the gross earnings between the 50th and the bottom 10th decile income earner as used by Moene and Wallerstein 2003. Assuming that the median income earner is the median voter and that the median income earner is rich enough to be inflation averse, then we expect to see no effect of income inequality on inflation. Instead we would expect to see that an increase in income disparity between the median and the low income earner is negatively correlated with inflation.

A number of economic and institutional variables that influence inflation and which have been used in the literature (Franzese, 1999) are controlled for. *Wage bargaining coordination,* which has been considered a major institutional force for disinflation

[12] On interaction effects see Thomas Brambor, William Roberts Clark, and Matt Golder, 2006

(Calmfors and Driffill 1988, Soskice 1990), trade union density, which is thought to have an inflationary effect due to the trade unions' demand for pay increases (Cukierman, 1992) and *the size of the financial sector* which is expected to have a disinflationary effect, as argued by Posen (1993). The *percentage of those older than 65* is also included to control for the social transfers that are directed to old age benefits rather than to those hurt by disinflation. One reason why social transfers might be higher when inflation is lower might be due to large number of pensioners who receive social transfers in the form of pensions. At the same time, pensioners tend to be inflation averse because they rely on their savings for consumption. Thus, the larger the share of the population above 65, the higher the social transfers are expected to be and the lower inflation

The economic controls included are *GDP and GDP growth, the unemployment rate and trade openness*. All of the economic controls are expected to be correlated with social transfers. If they are excluded them from the regression model the role of social transfers on disinflation is expected to be inflated. Thus, when testing the effects of social transfers in this model one tests their effects after having accounted for their increase due to higher unemployment, lower national income and income growth. The higher domestic income is the lower inflation is expected to be. On the other hand, higher growth can trigger inflation through increased economic activity but it can also lead to a decrease in inflation since disinflationary policies are much less costly during periods of economic growth. On the contrary, unemployment tends to depresses inflation. Finally, trade openness has been known to have a disinflationary effect due to wage and price international competition (Campillo and Miron, 1997).

[table one here]

4.2 *The empirical model*

An error correction model is used in order to capture the short and long term dynamics of social insurance on disinflation[13]. The model is the following:

$$dy_t = \beta_1 dy_{t-1} + \beta_2 y_{t-1} + \beta_3 dx_t + \beta_4 x_{t-1}$$

All the independent variables in the model are both in lagged levels and in change apart from institutional variables that do not change much over time. Two different estimators are used: OLS with corrected standard errors by Beck and Katz (1995) and OLS fixed effects, or else the within estimator. The fixed effects estimator is an error component regression model which captures the unobservable individual and time effects (Baltagi, 2001). Since regression models estimate the partial effect of a regressor on the regressant, they average both over time and across countries. The fixed effects model is useful when one wants to test quasi-experimentally the effect of a variable across time and in the same country. Thus, whereas OLS has the advantage of measuring the cross sectional effects which are very informative in comparative politics, the fixed effects estimator shows to

[13] In error correction models, the interpretation of the dynamics is direct: the coefficient β_1 of the lagged change dependent variable informs us how persistent y is. Coefficient β_2 is the decay rate; how fast or slow y adjusts over time. If it does not decay, then y does not go back to its equilibrium condition. Coefficient β_3 of x is the instantaneous effect of x on y. Finally, coefficient β_4 of the level of x is the permanent relationship between the x and y. To estimate the long term effect of x on y, we divide coefficient β_4 of x by $1-\beta_2$

what extent the cross-sectional effects are country specific[14].

4.3 *Results and discussion*

4.3.1 The role of social, unemployment and employment insurance on price stability

[Table two here]

The results in table two verify the hypothesis that social, unemployment and employment insurance all matter for disinflation. All of them have negative and statistically impact. On the other hand and quite surprisingly CBI does not reach statistical significance. Looking in more detail at the effect of the regressors we generally see that the long term relationship seems to have a smaller impact that the short term relationship. Specifically, the long term relationship between unemployment compensation and disinflation is relative small and statistically insignificant where as the momentum relationship is quite large; a percentage increase in the change in the unemployment benefit reduces inflation by almost 0.3%. This means that an increase of the magnitude of 5% in the unemployment benefit brings inflation down by 1.5%. However the momentum impact of social insurance is even larger; 1% increase in spending in social insurance leads to a 0.5% decrease in inflation. This means that in the long run, an increase of social insurance from 15% of the GDP to 20% of the GDP will bring down inflation by 2.5%. Of course, a five percent increase in the GDP devoted to social transfers is a rather high

[14] The fixed effects transformation is obtained by first averaging the following equation over time to $y_{it} = x_{it}\beta + c_i + u_{it,} \quad t = 1, 2 \ldots T$ to get the cross section equation: $\bar{y}_i = \bar{x}_i\beta + c_i + \overline{u_i}$. Subtracting the first equation from the second we have the fixed effects transformed equation: $y_{it} - \bar{y}_i = (x_{it} - \bar{x}_i)\beta + u_{it} - \bar{u}_i$ (Baltagi, 2001, p13)

figure; however, these results capture both the cross-country, as well as within-country impact of social transfers in inflation; so they can also be understood as a country that devotes twenty percent of its GDP in social transfers has two percent less inflation than a country that devotes fifteen percent of GDP in social transfers. The long run relationship is much smaller. 1% increase in social transfers decreases inflation by 0.13%.

Going back to the impact of unemployment benefit, one might find that the hypothesis is not confirmed that countries with high unemployment benefit have lower inflation. Two things might be going one. The reason for this result is likely to be that unemployment compensation is the direct response to increasing unemployment, and thus controlling for unemployment we ask the following question: what is the effect of unemployment compensation on price stability, other than through its effect on an increase in unemployment? In equation three we see that employment protection has a significant and large negative effect on inflation as well. A change from intermediate to high employment protection reduces inflation by 2.6%. Japan, Austria, Finland and Sweden are the only four countries in the sample that had very high employment insurance. Both Austria and Finland had particularly low mean inflation rates of 1.3 and 2.9 respectively. On the other hand, Japan and Sweden had higher rates of 5.5 and 4 percent each, when the mean inflation rate in the period studied was 7.7. Also, Japan spent on average only 9% of its GDP on social transfers, when the other three countries spent on average almost twice as much, around 16% of their GDP. Thus, employment insurance might be a primary factor for keeping below the average inflation in Japan, as expected.

Finally, in equation four we include all the different measures of protection to see whether their impact decreases when one controls for their cumulative effect. What we see is that the R squared increases by almost 10% and they retain their negative signs and statistical significance. More so, the impact of the two variables of social insurance doubles while the coefficients of employment and unemployment protection do not change. This is an indication that the true model should include all the different variables of social, unemployment and employment protection since they capture different aspects of the cost of disinflation.

[Table three here]

Given the immediate impact of social transfers on disinflation and given that social transfer change over time, I test their impact using a fixed effects model. In table three, a nested model is estimated with fixed effects, both with and without the economic controls of unemployment and economic growth. The reason for the exclusion of the economic controls of growth and unemployment in the second model in table three is to test the *total* effect of social insurance on disinflation. Looking in the first equation in table three, unemployment benefit does not reach statistical significance, while the effect of social insurance on inflation is twice as large; in the long term relationship its impact increases from 0.2% to 0.7%, while the short term effects increase from 0.8% to 1% (meaning a 1% increase in the social transfers brings inflation down by 1%).

These results indicate, as expected, that social transfers are used during disinflation. This is why social insurance has a larger impact in the short term than as a long term

relationship. On the other hand employment protection loses its statistical significance. This is not surprising since, unlike social insurance which varies over time, the institutional variable of employment insurance does not and thus its effect is reduced when using a fixed effects estimator. Once again, hypothesis one is verified by showing that social insurance is the cushion against adverse events that create inflationary pressures.

4.3.2 The conditional role of central bank independence and social insurance on price stability

[Tables 4, 4a and 4b]

Tables 4a and 4b test the hypothesis that social transfers are a sufficient condition for price stability and that central bank independence is more successful in the presence of social transfers, respectively. In table 4a we see that social transfers have a large and negative impact on inflation at moderate (0.5 and 0.6) and high levels (0.7 and 0.8) of central bank independence while their effect decreases at low levels of CBI (0.4). Social transfers are more effective in bringing inflation down when CBI is present but at the same time, the level of CBI does not have a dramatic effect on the role of social transfers. This is an unexpected result but in line with the literature that argues that especially during the eighties and the nineties governments used both carrots (social welfare) and sticks (CBI) to dis-inflate as argued by Hassel (2003). Therefore, social insurance is a necessary but not a sufficient condition for disinflation; its effect increases in the presence of moderate central bank independence.

The fact that social insurance is a necessary condition for disinflation is also confirmed in table 4b: social transfers dramatically increase the impact of CBI on inflation. In table 4b we see how the effect of cbi changes on disinflation under different levels of social transfers. When social transfers are low (5% and 10% of the GDP) CBI has no effect on inflation while at higher levels of social insurance (15 and 20%) its impact and significance increases (although it does not reach conventional statistical significance). Thus, both social insurance and central bank independence matter for inflation; they both increase the disinflationary role of the other.

4.3.3 The role of income inequality on price stability with and without social insurance

[table five here]

Having tested the disinflationary role of social and employment insurance the question is whether income inequality has an impact on inflation with or without social insurance. I chose to add the variable of income inequality to model two of table two instead of the nested model four, for simplicity. In the first equation of table five we see that there is not a long term relationship between inequality and inflation. The lagged value of income inequality is not statistically significant. In order to test if social insurance modifies the effect of income disparity on inflation, I drop social insurance in model two. Indeed, the coefficient of the equilibrium relationship between income inequality and inflation increases by a factor of four. Although the variable does not yet gain conventional statistical significance, its effect is very large and it has a t-statistic of around 1.5. This is

a first indication that social insurance mitigates the long term inflationary impact of income inequality in the OECD countries. On the other hand, the short term relationship of inequality and inflation is statistically significant and negative. The impact is also large; one unit increase in income inequality brings down inflation by 15%! This result runs against the findings in the literature. Yet, it was expected that if the median voter is the median earner, an increase in inequality between her and the lowest 50^{th} decile might be an indication of an amelioration of her position and thus of an increasing anti-inflationary attitude.

5. Conclusions

This paper addresses the question whether monetary policy can be depoliticized. It has been argued that central bank independence has not changed the very nature of the political dilemmas of price stability to the extent that price stability requires that politicians prioritize monetary stabilization over output stabilization. Since disinflation has real monetary and output costs, the political dilemmas linked to the policy of price stability have not disappeared but they have rather taken a different form. Even when politicians cannot manipulate the interest rates or issue excessive amounts of money any more due to central bank independence, they still face high political costs when a monetary supply shock occurs.

Price stability is both an economic and a political outcome. It has been shown that countries with generous welfare states are likely to experience higher price stability than

countries with poor social insurance because the political cost of disinflation is lower when there is employment, unemployment and social protection. Price stability is a public good and as such it is bound to be underprovided when those paying asymmetrically high costs are not compensated. Compensation is measured as social insurance, unemployment benefits and employment protection since the cost of disinflation is the increased risk of unemployment and loss of income.

In the presence of these compensations, income inequality does not have the expected inflationary effect found in the literature of the political economy of less economically developed countries. Unequal income distribution increases the political pressures for redistribution through increased inflation. Social transfers seem to mitigate the political dilemmas born out of the redistributional nature of disinflations. Finally, the role of social insurance on disinflation is also tested in the presence of varying degrees of central bank independence. Moderate political independence of central banks increases the efficiency of social insurance on price stability, while very low and very high independence negate the positive disinflationary role of social transfers. However, while central bank independence has a moderate modifying effect on the disinflationary role of social insurance, social insurance is critical for the effective disinflationary role of central banks. Central bank independence alone does not have the expected negative effect on inflation at low levels of social insurance. Therefore, central bank independence is not a sufficient institution for successful disinflation. Social insurance is a necessary condition for the effective role of central banks as gate keepers of price stability.

Table 1: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Inflation	504	6.38	4.42	-0.71	24.23
Change in Inflation	504	-0.09	2.52	-11.37	11.51
Social Transfers	490	13.97	4.59	3.72	28.91
Change in Social Transfers	489	0.18	0.99	-10.08	3.88
Unemployment Benefit	375	7.46	6.05	0.00	24.90
Change in Unemployment Benefit	357	0.21	1.81	-10.70	8.10
Long term employment Protection	468	0.52	0.39	0.00	1.00
Trade Openness	486	60.30	28.01	11.24	146.45
Unemployment Benefit	430	6.11	3.56	0.08	16.90
RGDP	486	17.41	3.68	7.45	29.19
Change in RGDP	486	0.35	0.44	-1.72	1.81
Wage Coordination	486	3.36	1.41	1.00	5.00
Union Density	496	43.86	17.96	9.87	85.48
Financial Sector Employment	460	0.09	0.03	0.02	0.18
Central Bank Independence	502	0.50	0.20	0.15	0.95
Population above 65	468	0.12	0.18	-1.45	0.65
Change in Population above 65	486	12.77	2.38	6.90	18.28

Table 2: the effects of three different measures of social protection: unemployment benefit, social direct transfers and employment protection provided by firms with OLS panel corrected standard errors

	(1)	(2)	(3)	(4)
	Dcpi	Dcpi	Dcpi	Dcpi
Change in Inflation	0.166	0.146	0.162	0.173
	(0.102)	(0.092)	(0.090)	(0.101)
Lagged Inflation	-0.403	-0.353	-0.398	-0.396
	(0.083)**	(0.068)**	(0.072)**	(0.079)**
Trade Openness	-0.010	0.001	-0.004	0.012
	(0.008)	(0.006)	(0.006)	(0.009)
Unemployment	-0.172	-0.223	-0.288	-0.278
	(0.109)	(0.052)**	(0.067)**	(0.107)**
RGDP	-0.230	-0.237	-0.230	-0.253
	(0.117)*	(0.080)**	(0.080)**	(0.114)*
Income Growth	-1.864	-1.191	-0.430	-2.226
	(0.528)**	(0.425)**	(0.418)	(0.545)**
Wage Coordination	-0.284	-0.355	-0.152	-0.174
	(0.150)	(0.114)**	(0.127)	(0.134)
Union Density	0.015	0.013	0.014	0.015
	(0.009)	(0.006)*	(0.007)*	(0.011)
Financial Sector Employment	11.002	5.064	0.180	13.436
	(10.099)	(6.710)	(6.873)	(9.601)
CBI	-1.503	-0.835	-1.159	-0.240
	(0.872)	(0.708)	(0.785)	(0.898)
Change in Population over 65	0.739	0.404	0.743	0.792
	(1.695)	(0.691)	(0.812)	(1.663)
Lagged Population over 65	-0.038	-0.007	-0.017	0.037
	(0.084)	(0.064)	(0.063)	(0.079)
Lagged Unemployment Benefit	**-0.012**			**-0.052**
	(0.044)			**(0.044)**
Change in Unemployment Benefit	**-0.294**			**-0.243**
	(0.086)**			**(0.082)****
Lagged Social Transfers		**-0.088**		**-0.149**
		(0.032)**		**(0.045)****
Change in Social Transfers		**-0.561**		**-0.822**
		(0.151)**		**(0.258)****
Employment Protection			**-1.660**	**-1.314**
			(0.659)*	**(0.742)**
Constant	9.679	10.019	9.943	10.654
	(2.377)**	(1.895)**	(2.031)**	(2.234)**
Observations	265	352	365	258
Number of ctry	16	18	18	16
R-sq	0.29	0.27	0.23	0.36

Standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 3: the effect of all three different measures of social protection using fixed effects estimator

	(1) Change in Inflation	(2) Change in Inflation
Change in Inflation Lagged	0.136	0.217
	(0.057)*	(0.056)**
Inflation Lagged	-0.560	-0.499
	(0.054)**	(0.049)**
Trade Openness	0.067	0.062
	(0.032)*	(0.028)*
Unemployment	-0.503	
	(0.153)**	
RGDP	0.006	
	(0.194)	
Income Growth	-2.254	
	(0.428)**	
Wage Coordination	0.004	0.172
	(0.160)	(0.161)
Union Density	0.126	0.153
	(0.050)*	(0.045)**
Financial Sector Employment	-31.223	-38.050
	(13.750)*	(14.106)**
CBI	-0.842	1.936
	(4.701)	(4.906)
Change in Population above 65	0.598	0.423
	(1.188)	(1.146)
Population above 65	0.264	0.185
	(0.428)	(0.256)
Unemployment Benefit	**0.010**	**-0.127**
	(0.075)	**(0.052)***
Change in Unemployment Benefit	**-0.117**	**-0.021**
	(0.098)	**(0.081)**
Social Transfers	**-0.461**	**-0.526**
	(0.139)**	**(0.121)****
Change in Social Transfers	**-1.023**	**-0.344**
	(0.237)**	**(0.214)**
Employment Protection	**-2.001**	**-0.996**
	(1.214)	**(1.077)**
Constant	5.421	0.949
	(3.550)	(3.658)
Observations	258	312
Number of ctry	16	18
R-squared	0.48	0.38

Standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 4: testing the role of social transfers conditional upon CBI and the role of CBI conditional upon social transfers

	Change in Inflation
Change in Inflation lagged	0.150
	(0.091)
Inflation lagged	-0.356
	(0.068)**
Trade Openness	0.001
	(0.005)
Unemployment	-0.229
	(0.053)**
RGDP	-0.243
	(0.081)**
Income Growth	-1.184
	(0.426)**
Wage Coordination	-0.339
	(0.117)**
Union Density	0.011
	(0.006)*
Financial Sector Employment	4.185
	(6.726)
Change in Population above 65	0.409
	(0.693)
Population above 65	-0.010
	(0.064)
CBI	**2.029**
	(2.828)
Change in Social Transfers	-0.560
	(0.151)**
Social Transfers	**0.014**
	(0.102)
CBI*Social Transfers	**-0.204**
	(0.192)
Constant	8.842
	(2.177)**
Observations	352
Number of ctry	18
R-sq	0.27

Standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 4a: The effect of social transfers on change in inflation under different degrees of central bank independence

	Social Transfers		
CBI	Coefficient	Std. Err.	Z
0.4	-0.067	0.037	-1.8
0.5	-0.087	0.031	-2.77
0.6	-0.108	0.036	-2.95
0.7	-0.128	0.049	-2.62
0.8	-0.149	0.065	-2.29
0.9	1	1.91	0.53

Table 4b: The effect of central bank independence on change in inflation under different levels of social transfers

	CBI		
Social transfers	Coefficient.	Std. Err.	Z
5%	1.007	1.914	0.5
10%	-0.015	1.081	-0.0
15%	-1.037	0.721	-1.4
20%	-2.059	1.310	-1.5

Table 5: testing the effect of pre-tax income disparity between the median and poorer households, both with OLS panel corrected standard errors.

	(1) Change in Inflation	(3) Change in Inflation
Change in Inflation Lagged	0.214	0.171
	(0.082)**	(0.089)
Inflation Lagged	-0.402	-0.349
	(0.065)**	(0.068)**
Trade Openness Lagged	-0.004	-0.005
	(0.006)	(0.007)
Unemployment Lagged	-0.283	-0.244
	(0.064)**	(0.063)**
RGDP Lagged	-0.372	-0.248
	(0.099)**	(0.102)*
Income Growth	-0.905	-0.115
	(0.373)*	(0.396)
CBI Lagged	0.471	-0.822
	(0.756)	(1.077)
Change in Population above 65	-0.003	-0.162
	(0.617)	(0.677)
Population above 65 Lagged	0.093	0.075
	(0.081)	(0.094)
Wage Coordination Lagged	-0.426	-0.249
	(0.176)*	(0.185)
Union Density Lagged	0.015	0.008
	(0.007)*	(0.009)
Financial Sector Employment Lagged	11.582	5.641
	(6.563)	(7.503)
Social Transfers Lagged	**-0.098**	
	(0.036)**	
Change in Social Transfers	**-0.547**	
	(0.134)**	
lnp50p101	**0.784**	**2.603**
	(1.657)	**(1.836)**
dlnp50p10	**-15.393**	**-13.928**
	(5.187)**	**(5.614)***
Constant	10.581	6.269
	(2.505)**	(2.315)**
Observations	226	237
Number of ctry	16	17
R-sq	0.32	0.22

Standard errors in parentheses
* significant at 5%; ** significant at 1%

Data appendix

Variable definitions and data sources

Variable name	Definition and Measurement	Sources
Dependent variable		
Disinflation	This year's inflation minus last year's inflation, or else the change in inflation. Measured by the consumer price index, as percent change from prior year.	IMF, International Financial Statistics Yearbook, 1979 (1949-59), 1990 (for 1960-89) and 1996 (1990-1994). IMF International Financial Statistics Database, line at 64 at www.infstatistics.org, December 2003
Independent variables		
Level and Change in Unemployment benefit	Benefit expenditure on unemployment as a percentage of total social insurance benefit expenditure.	ILO, The cost of Social Security, Tables 11, 10, 8, various years
Social Transfers and change in social transfers	Social Security Transfers as a percentage of GDP. Consists of benefits for sickness, old-age, family allowance, etc, social assistance grants and welfare.	OECD, Historical Statistics, various years (2001).
Long term employment security	Long-term employment security guaranteed by firms. 1=long-term (in some cases life-time) employment common in large firms; .5=some firms provide medium or long-term security (facilitated by relatively low unemployment rate); 0= employment security relatively uncommon.	Hicks, Alexander and Lane Kenworthy, 1998
Income disparity	The logged ratio of the gross earnings received by the worker at the 50^{th} percentile to the wage received by the worker at the 10^{th}	OECD Database on Trends in Earnings, Paris
Central Bank Independence	Central Bank Independence (0-1). It is the average of five common indices: LVAU and QVAU from Cukierman (1992), EC and POL from Grilli et al (1991), and the original index from Bade and Parkin (1982).	Franzese 1999
Institutional and economic Controls		
Wage Coordination	Coordination of Wage Bargaining (1-5). 1=fragmented wage bargaining,	Lane Kenworthy, 2001

	confined largely to individual firms or plants; 2=bargaining mainly at industry level with little or no pattern-setting; 3=industry level bargaining with reasonably strong pattern-setting but only moderate union concentration; 4=centralized bargaining by confederations or government imposition of wage schedule freeze and high degree of union concentration; 5=centralized bargaining by confederations or government imposition of wage schedule, extremely high degree of union concentration.	
Union density	Union members as a share of labor force	Golden and Wallerstein (1995)
Financial sector employment	Financial-Sector Employment (%). Finance, Insurance, Real Estate, and Banking Employment as a percent of total employment.	OECD National Accounts Volume II, Detailed Tables, various years
Age distribution	Age distribution of those above 65	OECD Labour Force Statistics various years
Gross Domestic Income and Gross Domestic Income growth	The level and the change in Gross Domestic Income, following the recommended method in the UN System National Accounts. It is the 1996 international price value of domestic absorption of a country in a given year plus exports minus imports deflated by the deflator and the 1996 PPP of domestic absorption. I divide these variables by 1000 to make their impact easier to understand.	The Penn World Table Version 6.1, Center for International Comparisons at the University of Pennsylvania (CICUP), October 2002.
Unemployment rate	Standardized Unemployment Rate	OECD, Quarterly Labor Force Statistics, No 4, 1999
Trade openness	Current-prices economic openness (exports+imports as % of current GDP). Exports plus imports divided by Real Gross Domestic Product Per Capita, in current prices, is the total trade as a percentage of GDP. The export and import figures are in national currencies	World Bank and the United Nations Archives

Appendix 2

Derivation of the abbreviated solutions:

Its optimization problem with respect to its private good and inflation is the following:

$\max: U_r = x^a \xi^{1-a}$ *subject to* $x_r = s - s\xi$ (2)

The Langragian for this constrained maximization problem is:

$$L = x^{\alpha} \xi^{1-\alpha} + \lambda \left(x - s - s\xi \right)$$

To make calculations easier, we take the log of the exponential utility function so that the Langragian we estimate is the following:

$$L = \alpha lnx + (1-\alpha) \ln\xi + \lambda \left(x - s - s\xi \right)$$

The first order conditions are:

$$\frac{\partial L}{\partial x_r} = \frac{\alpha}{x_r} - \lambda \quad (3)$$

$$\frac{\partial L}{\partial \xi} = \frac{1-\alpha}{\xi} - \lambda s \quad (4)$$

$$\frac{\partial L}{\partial \lambda} = s - s\xi - x \quad (5)$$

Setting the partials to zero we solve this three equation system.

(3)=(4): $\frac{\alpha}{x_r} = \frac{1-\alpha}{s\xi} \Rightarrow x_r = \frac{\alpha s \xi}{1-\alpha}$ (6)

setting (5) to zero, and (5)=(6): $x_r = \frac{\alpha s \xi}{1-\alpha} = s\left(1-\xi\right) \Rightarrow \xi^{\times} = 1-\alpha$ (7)

Substituting (7) back to (5), we derive $x_r^{\times} = \alpha s$

Similarly we derive the critical points for the poor.

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