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Is there a Case for Price-level Targeting?

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ABSTRACT/RÉSUMÉ

Is there a case for price-level targeting?

There is a case, but there are also counter-arguments. With sufficient forward-looking behaviour among firms and households, price-level targeting can act as a powerful built-in stabiliser through automatic shifts in inflation expectations. This stabilisation mechanism reduces the need for large shifts in policy rates, alleviating the risk of hitting the zero lower bound of nominal interest rates and falling into a liquidity trap. Furthermore, credible price-level targeting can support capital accumulation by protecting the long-run purchasing power of money and reducing the inflation risk premium embedded in actual long-term real interest rates. However, price-level targeting can imply welfare-reducing policy-induced output volatility in situations where the degree of forward-looking behaviour is very low. The self-regulating capacity of price-level targeting can be undermined if central banks are not fully credible. Besides, aggressive inflation targeting can replicate some of (but not all) the benefits of price-level targeting. On balance, the case for adopting price-level targeting is not clear-cut, all the more so since transition costs are likely to be significant.

JEL classification: E42, E52.
Keywords: price level targeting; monetary policy; central banks; monetary systems; inflation targeting; price stability; liquidity trap; zero lower bound.

* * * * *

Y a-t-il beaucoup à dire en faveur du ciblage du niveau des prix ?

Oui, mais il y a aussi de sérieux contre-arguments. Si une part suffisante des entreprises et des ménages présente un comportement tourné vers l'avenir, le ciblage du niveau des prix peut fonctionner comme un puissant outil de stabilisation autonome grâce aux ajustements automatiques des anticipations des inflations. Ce mécanisme limite le besoin d'opérer de larges mouvements des taux directeurs, ce qui réduit le risque de heurter la borne zéro sur les taux d'intérêt et de tomber dans une trappe à liquidités. Qui plus est, grâce à la manière dont elle protège le pouvoir d'achat de la monnaie, une politique crédible de ciblage du niveau des prix peut encourager l'accumulation de capital en réduisant la prime contre le risque d'inflation qui est incorporée aux taux d'intérêts réels effectifs. Néanmoins, le ciblage du niveau des prix peut entraîner une volatilité de l'activité préjudiciable au bien-être social si la part des ménages et des entreprises qui sont tournés vers l'avenir est très faible. La capacité de stabilisation automatique d'un régime de ciblage du niveau des prix peut aussi être amoindrie si la banque centrale manque de crédibilité. Par ailleurs, une stratégie de ciblage agressif du taux d'inflation peut reproduire une partie (mais non pas l'ensemble) des avantages du ciblage du niveau des prix. Tout bien pesé, les arguments en faveur du ciblage du niveau des prix ne justifient pas de manière nette un changement de stratégie monétaire, d'autant plus que les coûts de transition risquent d'être élevés.

Classification JEL : E42; E52
Mots clés : ciblage du niveau des prix; politique monétaire; banques centrales; régimes monétaires; ciblage d'inflation; stabilité des prix; trappe à liquidités; borne zéro des taux d'intérêt.

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IS THERE A CASE FOR PRICE LEVEL TARGETING?

Boris Cournède and Diego Moccero[1]

1. Introduction

1. There is widespread recognition among academics and policymakers that monetary policy should aim at price stability. A large number of economies have adopted inflation targeting as the main objective of monetary policy, aiming at maintaining low and predictable inflation rates as a way of preserving the purchasing power of money. Evidence abounds that targeting inflation has been successful in anchoring and stabilising inflation rates and inflation expectations, with no apparent increase in output volatility, from the end of the 1980s to the beginning of this century (Mishkin and Schmidt-Hebbel, 2001 and 2007). Moreover, there is mounting evidence that inflation targeting contributes to keeping inflation low and predictable (Angeris and Arestis, 2008; Benati, 2008; Fatás *et al.*, 2006; Calderón and Schmidt-Hebbel, 2008).

2. Nonetheless, current monetary policy frameworks have been brought into question by the frequency with which deflation has taken hold of or threatened OECD economies. Japan went through a period of deflation in 2000-06 while the United States was perceived to be exposed to a deflation risk in 2001 and again in 2003. A consequence of the current financial and economic crisis is that deflation has once more emerged as a risk, this time in many OECD countries, while it has taken hold of Japan again. While monetary policy frameworks may need to be reassessed with a view to reducing deflation risk, any changes should occur only once the economy has established and current objectives are attained for fear of undermining confidence in central banks. Against this background an alternative interpretation of price stability has attracted increasing attention from policy makers in the recent past (Ambler, 2009; Parkin, 2009): it is the notion of *price level* stability, where the monetary authority aims at stabilising an aggregate price level around a pre-specified path, instead of its rate of change. A principal advantage of price-level targeting is that it is more consistent with the objective of preserving the long-run purchasing power of money. For instance, following a temporary inflation spike, such as that observed in 2005-07, inflation targeting regimes will leave the purchasing power of money permanently below what would be expected on the basis that inflation targets would be met. A successful price-level based framework would also avoid a permanent increase in the real value of debt after a period of deflation. Practical experience of price-level targeting is, however, restricted to one historical episode, in Sweden during the 1930s.

3. Against this background, the present study analyses whether, and in what circumstances, targeting the price level would have economic advantages over inflation targeting for output and price

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1. The authors are members of the Macroeconomic Policy Division of the OECD Economics Department. The authors are indebted to Sebastian Barnes, Hervé Boulhol, Andrea De Michelis, Jørgen Elmeskov, Romain Duval, David Haugh, Peter Hoeller, Jens Høj, Jeremy Lawson, Robert Price, Jean-Luc Schneider, Klaus Schmidt-Hebbel, Luke Willard and Eckhard Wurzel for their useful comments. The authors are grateful to Catherine Lemoine for statistical assistance and Susan Gascard and Veronica Humi for secretarial assistance. The opinions expressed in this paper are those of the authors and are not necessarily shared by the OECD or its member countries. Corresponding author: boris.cournede@oecd.org, +33 1 45 24 90 37.

stability. There appear to be pros and cons, the main benefits of price-level targeting identified in the paper being:

- Depending on a minimum share of firms and households behaving in a forward-looking manner, a price-level targeting regime can act as a built-in stabiliser by reducing the need for large moves in policy interest rates in response to shocks. For instance, faced with a price level fall, agents would expect inflation to rise to bring the price level back to its target path, which would reduce the long-term real interest rate, thereby working to support activity and pushing up prices.[2]
- Insofar as the expectations channel reduces the need for large shifts in policy interest rates, the economy will be less likely to fall into a liquidity trap.
- A credible price-level targeting mechanism can have a positive effect on capital accumulation and steady-state growth insofar as it reduces the cost of long-run nominal contracts by protecting the long-run purchasing power of money. In particular, the inflation risk premium embedded in equilibrium long-term interest rates can be expected to be lower.
- Targeting the price level could also mitigate the risk of price shocks passing through to wages, by protecting against the redistributive effects of unanticipated inflation and reducing the incentive to index wages.

4. On the other hand, price-level targeting is not without cost or risks, which reduce its practical application:

- Inflation targeting is better at protecting against welfare losses than price-level targeting when there is strong uncertainty about the presence of a sufficient minimum degree of forward-looking behaviour of economic agents.
- The self-regulating capacity of price-level targeting may be undermined if central banks are not fully credible. An initial lack of credibility may force central banks to choose a too short policy horizon, inducing output gap and nominal interest rate volatility.
- If the inflation targeting regime is sufficiently aggressive it may replicate a number of (but not all) the beneficial stabilising features of a price-level targeting monetary framework.

5. Weighing the pros and cons of price level targeting, there is no clear-cut case for a change in the monetary regime. This is especially the case since transition costs from moving from one regime to the other (for example in terms of communication strategy and compromising credibility) may be significant. More practical experience is needed before one can definitely conclude that price level targeting constitutes a worthy alternative to current monetary frameworks.

6. The next section presents the main advantages of price-level targeting. Section 3 discusses the drawbacks. The paper then addresses implementation issues, in particular regarding the time frame over which the monetary authorities aim at reaching the target, before discussing the Swedish experience with price-level targeting.

2. The benefits of price-level targeting

A built-in stabilisation mechanism

7. A key benefit of price-level targeting is the automatic stabilisation that results from changes in inflation expectations. Whenever a shock hits the price level, a credible price-level targeting regime will

2. Similarly, an increase in inflation would imply lower inflation expectations and therefore higher real interest rates, in turn damping demand and inflation.

prompt a change in expected inflation that goes in the opposite direction. The resulting change in the *ex ante* real interest rate will cause aggregate demand to adjust in such a way that output and employment are partly stabilised. For instance, in the case of an unexpected cost-push shock that causes inflation to deviate from target at the end of the period, next-period expected inflation does not change under inflation targeting, unless the target changes. In contrast, under price-level targeting, the sum of future inflation rates has to match the negative of the actual inflation gap (percentage difference between the price level and the target): if the inflation gap is positive and high today, inflation should undershoot in the future. To the extent that they are forward-looking, households and firms will anticipate that the central bank will tighten monetary policy in order to bring the current price level in line with the target. For a given interest policy rate, the reduction in expected inflation will increase the *ex-ante* real rate, which will help contain aggregate demand and help to equilibrate output and prices.[3]

Protection against a liquidity trap

8. Price-level targeting may reduce the probability of falling in liquidity traps when economic agents are forward-looking. The reason is that, as mentioned above, a credible regime will be self-stabilising and therefore requires smaller moves in nominal interest rates, reducing the probability of hitting the zero lower bound. Simulation results show that, in both a benchmark model with forward-looking agents and a variant including significant backward-looking behaviour, credible price level targeting is a powerful cure against the risk of falling into a liquidity trap (Box 1).[4]

Box 1. Price-level targeting as protection against hitting the zero lower bound

Price-level targeting can help avoid hitting the zero lower bound on interest rates when faced with very weak demand. Under price-level targeting, when a negative demand shock brings inflation down or even in negative territory, households and firms expect that the monetary authorities will credibly generate high inflation in the future, after the economy has exited the demand deficit situation, in order to get back to the target path for the price level. This automatic mechanism implies that *real* interest rates will automatically go down after a negative demand shock under price-level targeting, which helps to offset part of the shock. This automatic stabilisation mechanism is absent under inflation targeting where, because "bygones are bygones", the central bank cannot credibly commit to keeping inflation above target in the future after the economy is out of the situation of weak demand.

A simple dynamic stochastic general equilibrium (DSGE) model can be used to illustrate how markedly the two regimes can differ in this respect, at least when households and firms are forward-looking. The model is based on profit-maximising firms and utility-maximising households in an environment where firms produce differentiated goods and have pricing power but only a fraction of firms can reset their prices in each period. In this setting, and with a credible positive long-run inflation target $\bar{\pi}$, actual inflation π_t and the output gap y_t follow a forward-looking New Keynesian Phillips curve (1) and a dynamic IS curve (2).[1] In these equations, r_t^n is the natural real rate of interest, and μ_t and ν_t are stochastic shocks on prices and aggregate demand. The frequency of price adjustment (θ) is assumed to be invariant to the choice of monetary policy regime. The other parameters are structural: β stands for the discount rate, σ is the coefficient of relative risk aversion and κ is a structural parameter function of β, σ, the elasticity of labour supply (ϕ), the degree of substitutability across differentiated goods (ε) and the equilibrium capital share (α).[2] In this framework, the welfare loss resulting from the presence of partly inflexible prices can be calculated as expression (3) in terms of the equivalent loss of steady-state consumption (Woodford, 2003; Galí, 2008).

3. The case where the monetary authorities are not fully credible is analysed later in the text.

4. Cover and Pecorino (2005) obtain the same result in a dynamic IS-LM model that incorporates a significant degree of backward-looking consumption behaviour.

$$\pi_t = (1-\beta)\bar{\pi} + \beta E_t[\pi_{t+1}] + \kappa y_t + \mu_t \quad (1)$$

$$y_t = E_t[y_{t+1}] - \tfrac{1}{\sigma}\left(i_t - E_t[\pi_{t+1}] - r_t^n\right) + \nu_t \quad (2)$$

$$W_0 = -\tfrac{1}{2} E_0\left[\tfrac{\varepsilon}{\lambda}(\pi_t - \bar{\pi})^2 + \left(\sigma + \tfrac{\phi+\alpha}{1-\alpha}\right) y_t^{\,2}\right] \quad (3)$$

This framework permits the comparison of different monetary policy strategies, defined as instrument rules relating the policy rate to economic variables. A conventional Taylor rule (4) with usual coefficients is compared to a very soft price-level targeting rule (5) where p_t stands for the log price level, which evolves as $p_t = p_{t-1} + \pi_t$. The values of structural parameters are set as in Galí (2008) while the estimates by Smets and Wouters (2003) and Galí, Gertler and López-Salido (2007) are used to calibrate the demand and cost-push shocks respectively.[3]

$$i_t = r_t^n + \bar{\pi} + 1.5(\pi_t - \bar{\pi}) + 0.5 y_t \quad (4)$$

$$i_t = r_t^n + \bar{\pi} + 0.2(p_t - \bar{\pi}\, t) + 0.5 y_t \quad (5)$$

The simulation results shown in Box Table 1 illustrate the powerful stabilising effect of price-level targeting in e model for an economy hit by persistent cost-push and demand shocks. Even under the very soft price-level targeting rule studied here, where the coefficient on price deviations is quite small, the policy rate is much more stable than under a standard Taylor rule. As a result, the zero lower bound is never hit. In contrast, with a Taylor rule monetary policy regime, nominal interest rates are negative nearly 7% of the time. The greater stabilisation power of price-level targeting also leads to a sizeable reduction in the welfare costs of fluctuations compared with inflation targeting in the simulations (even assuming, as is implicit in the model, that negative nominal rates are practically feasible).

Box Table 1. Compared simulated effects of inflation and price-level targeting

	Benchmark model		Model with 60% backward-looking indexation	
	Standard Taylor rule	Soft price-level target	Standard Taylor rule	Soft price-level target
Per cent of time when short-term nominal interest rates are negative	6.9	0.0	8.1	0.0
Standard deviation of nominal interest rate	0.7	0.2	0.7	0.2
Standard deviation of real cost of capital	0.3	0.2	0.3	0.2
Standard deviation of inflation	0.5	0.1	0.5	0.2
Standard deviation of output	0.3	0.5	0.3	0.5
Welfare loss due to output and inflation fluctuations (equivalent cut in steady state consumption, per cent)	8.6	1.3	2.2	1.0

Note: Each simulation has been run over 10 000 quarters using random draws of the shocks and solving as in Blanchard and Khan (1980).

It should be highlighted, however, that, while the model is micro-founded and solved in general equilibrium, it is built on strong assumptions. In particular, all firms consider that the inflation target will be met on average in the long term and form their price expectations accordingly in a purely forward-looking way. This assumption is relaxed in an extension where, following Woodford (2003, pp. 213-216), in each period, sixty per cent (γ=0.6) of firms that do not re-assess their prices let them increase in line with *past* inflation π_{t-1} instead of the long-run inflation target $\bar{\pi}$. In this setting, the Phillips curve becomes the hybrid specification (6) and the welfare loss due to fluctuations is given by (7). The results in columns 3 and 4 of Box Table 1 indicate that the conclusions reached under the benchmark, forward-looking model still obtain in the extended model: interest rates are more variable and the zero lower bound is hit more frequently under inflation targeting.

The hybrid model incorporates strong implicit assumptions such as flexible wages and complete financial markets. While wage rigidities, nominal or real, would be likely to narrow the welfare gap between inflation and price-level targeting (because they imply a greater weight of output gap deviations in the loss function), they would probably not qualitatively alter the results on the frequency at which the zero lower bound is hit. The reason is that adding wage rigidities amounts to incorporating more persistence and the base model is already quite persistent because of the high

autocorrelation of the shocks while the extended model incorporates a lot of additional inertia because of indexation. In contrast, it may be conjectured that relaxing the assumption of complete financial markets by including liquidity constrained households would partly reduce the benefit of price-level targeting because the stabilising feedback from the price-level target on real interest rates will only influence unconstrained households. Another valuable extension would be to compare the two regimes in an open-economy setting. A last extension would consist in making some of the parameters regime dependent, starting with the frequency of price adjustment.

$$\pi_t = \frac{\gamma\pi_{t-1} + (1-\beta)(1-\gamma)\bar{\pi} + \beta E_t[\pi_{t+1}] + \kappa y_t + \lambda \mu_t}{1+\beta\gamma} \quad (6)$$

$$W_0 = -\tfrac{1}{2} E_0\left[\tfrac{\varepsilon}{\lambda}\left(\pi_t - (\gamma\pi_{t-1} + (1-\gamma)\bar{\pi})\right)^2 + \left(\sigma + \tfrac{\phi+\alpha}{1-\alpha}\right) y_t^{\,2}\right] \quad (7)$$

1. The inflation target $\bar{\pi}$ is credible in the sense that firms that do not re-examine their price in the light of future demand in a given period instead increase their prices at the rate $\bar{\pi}$ as in Yun (1996). See Woodford (2003, p. 213) for the expression of the New Keynesian Phillips curve in presence of a positive inflation target. The derivation of the welfare loss function (3) in this setting is an exact parallel of the proof of Proposition 6.5 in Woodford (2003).

2. $\kappa = \lambda\left(\sigma + \frac{\phi+\alpha}{1-\alpha}\right)$ where $\lambda = \frac{(1-\theta)(1-\beta\theta)(1-\alpha)}{\theta(1-\alpha+\alpha\varepsilon)}$.

3. The corresponding values are: β =0.99, θ =2/3, α =1/3, ε =6, σ =1, ϕ =1. The shocks are AR(1) with standard deviations $\sigma(\mu_t)$=0.09 and $\sigma(\nu_t)$=0.297 and autocorrelations $\rho(\mu_t)$=0.88 and $\rho(\nu_t)$=0.93. Finally, r_t^n =4% and $\bar{\pi}$ =2%.

9. A related but distinct question is which monetary policy regime is better equipped to help the economy go out of a liquidity trap. If price-level targeting is introduced once the economy is already "trapped," the stabilising real interest rate effect may not materialise, because households and firms may question the credibility of the announced long-term commitment to the new regime. Even if credibility is ensured, the stabilising properties of price level targeting may be diminished because the elasticity of demand with respect to the real interest rate is likely to be smaller in a liquidity trap, where the traditional monetary policy transmission mechanism is weakened (Aoki and Yoshikawa, 2006). Unconventional monetary policy actions such as expanding the central bank balance sheet and altering the composition of its assets may be more appropriate in this situation (Bernanke and Reinhart, 2004).

A stable nominal anchor for planning and contracting

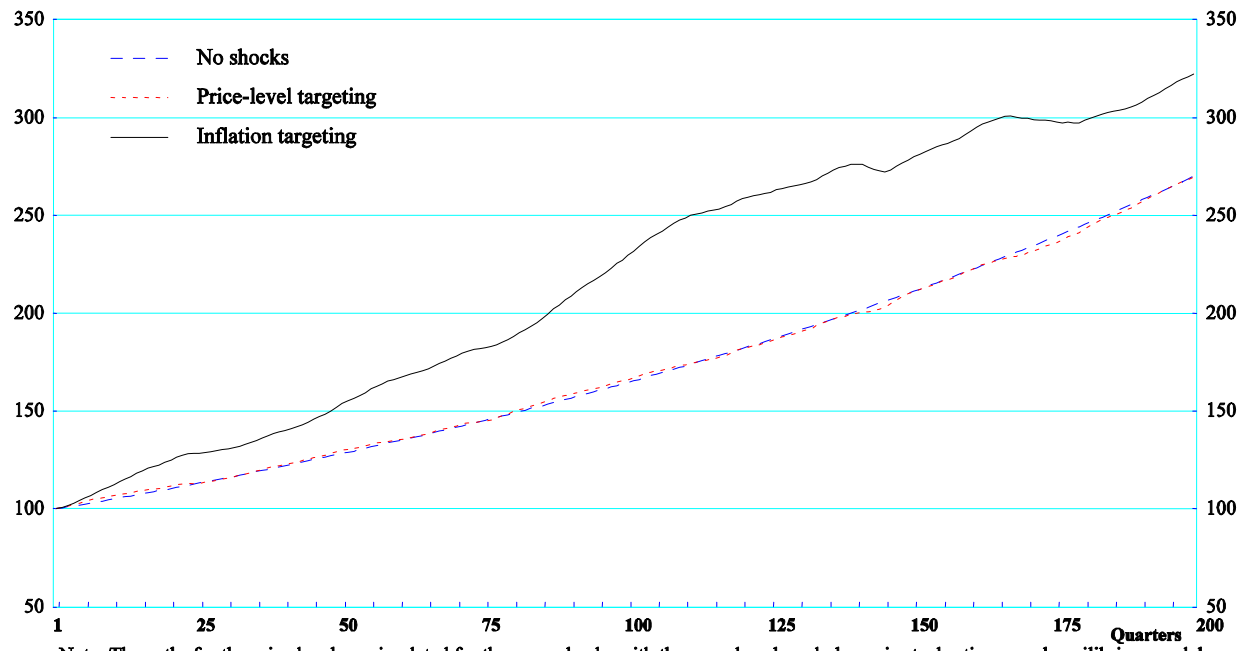
10. Price-level targeting also has the advantage of eliminating uncertainties about the future purchasing power of money, because it better anchors long-run price levels. A price-level targeting regime ensures that the actual price level fluctuates around the long-run trend implied by the target path. A valuable consequence is that the variance of the price level does not increase with the time horizon. In contrast, under inflation targeting, shocks affect the price level used as a base for the inflation target in the succeeding period. Since the central bank does not compensate for deviations in this base – "bygones are bygones" –, the price level follows a random walk with drift process. In other words, one-off shocks to inflation have a permanent effect on the price level under inflation targeting. In addition, the variance of the price level therefore increases over time, implying that the purchasing power of money becomes more and more uncertain as the time horizon extends further in the future.

11. Model simulations suggest that sizeable differences can emerge in the purchasing power of money between a price level and an inflation targeting regime. Figure 1 shows that, in the benchmark model presented in Box 1, the same shocks result in very different trajectories for the price level even if both monetary regimes target the same steady-state inflation rates. In particular, even a "soft" price-level target such as the one used in the benchmark model pins down the price level on its target path quite

strongly.[5] The fact that, in contrast, shocks have permanent effects on the price level under inflation targeting, which is evident in the model simulations shown in Figure 1, is also visible in historical data. As an illustration, Figure 2 compares the historical price level in the four largest OECD economies to the trajectory that it would follow if inflation remained constant on its *de jure* or *de facto* target rate.

Figure 1. Prices over long periods: price-level vs. inflation targeting in model simulations

Figure 2. Prices over long periods : price-level vs. inflation targeting in model simulations



Note: The paths for the price level are simulated for the same shocks with the same benchmark dynamic stochastic general equilibrium model presented in Box 1 but with different rules for monetary policy: a standard inflation-targeting Taylor rule and a soft price-level rule.
Source: OECD Calculations.

12. The variability of inflation will also differ between the two monetary regimes. The conventional wisdom maintains that short-run inflation volatility should increase under price level targeting, because unexpected increases in the price level should be followed by attempts to reduce inflation. This applies where shocks are purely random or have a very low degree of persistence; price-level targeting can then require that past deviations be offset. However, when shocks are highly auto-correlated, as historical experience suggests is the case[6] price-level targeting will reduce the short-term variability of inflation both when monetary authorities can commit to a rule (as in the benchmark model presented in Box 1) and when they act in a discretionary manner (as in Svensson's model, 1999). Again, the expectation channel is at the origin of this effect. For instance, following a persistent cost-push shock, expected inflation will fall under price-level targeting, which will work *via* the Phillips curve to reduce actual inflation, thereby partly

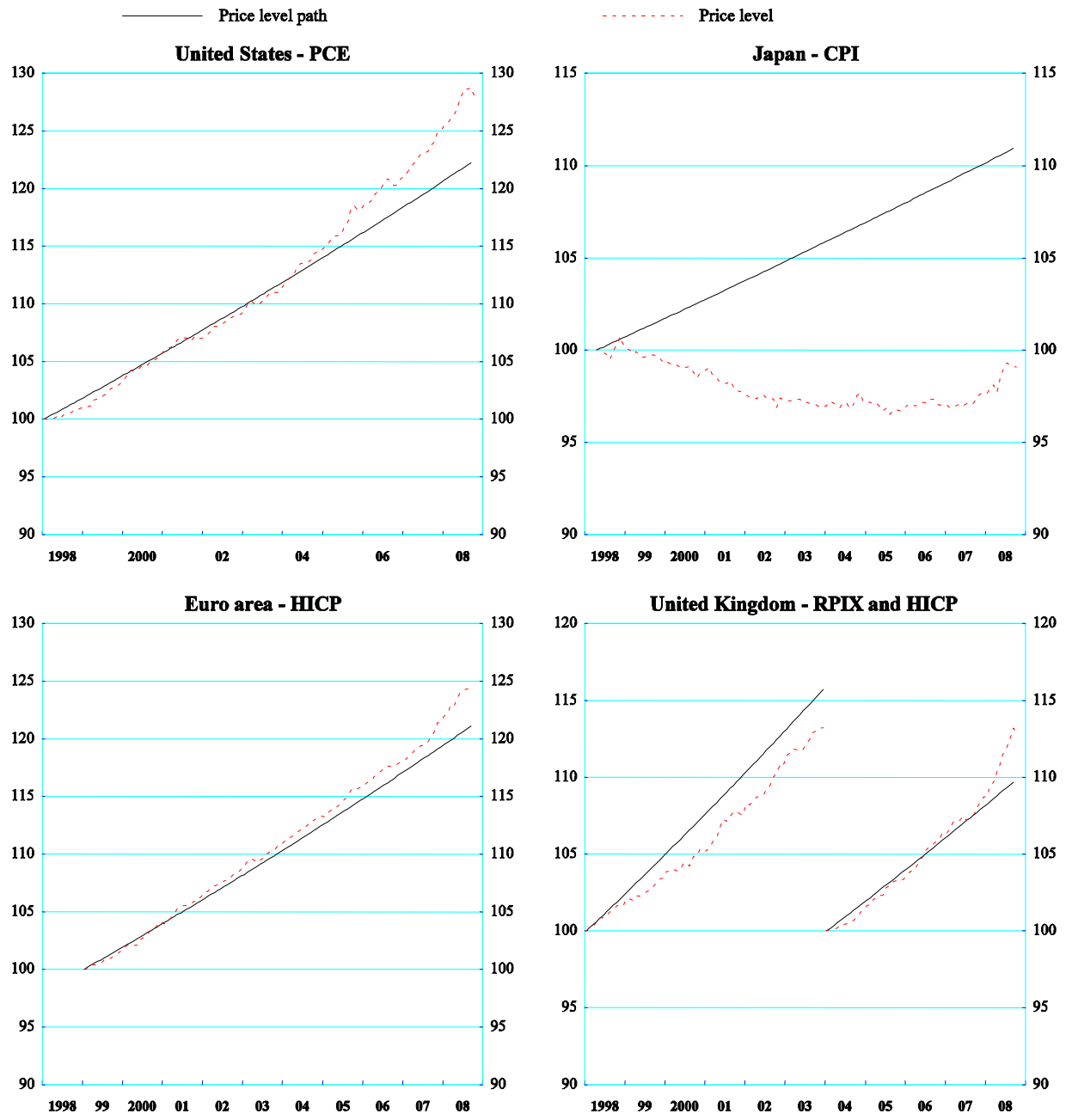
5. The fact that the long-term slope coefficient of the price level is lower under price-level than inflation targeting in Figure 1 is purely a result of the non-stationary nature of the price level under inflation targeting and the configuration of the random draws of the shocks in the particular simulation shown. Under commitment in monetary policy, the log of the price level will exhibit the same long-term slope coefficient under both monetary policy regimes when averaged across different draws of the shocks. In contrast, if monetary policy is conducted in a discretionary fashion, the log of the price level will exhibit a steeper slope under inflation rather than price level targeting (Svensson, 1999).

6. See for instance Smets and Wouters (2003).

offsetting the effect of the continued shock. The same reasoning applies identically following a persistent demand shock.

Figure 2. Price index and price level target path for selected countries

Figure 3. Price index and price level target path for selected countries



Note : For the United States, the price stability path target assumes an implicit inflation rate of 1.9%. The sample period starts in 1998 for the sake of comparability with other countries.
For Japan, the price stability path target assumes an implicit inflation rate of 1%. The sample starts with the enactment of a new Bank of Japan Act stating price stability as the goal of monetary policy.
For the euro area, the price stability path target assumes an implicit inflation rate of 2%. The sample period starts with the irrevocable fixing of the member countries' exchange rates.
For the UK, the price stability path target assumes an implicit inflation rate of 2.5% until December 2003, and 2% thereafter. The price index targeted by the monetary authorities is the retail price index excluding interest payments (RPIX) until December 2003 and the consumer price index (CPI) thereafter. The sample starts with the new monetary policy framework by which the monetary authority sets interest rates to meet the inflation target.
Sources : Bureau of Economic Analysis (BEA) for United States, Datastream for Japan, Eurostat for Euro area and Office for National Statistics (ONS) as well as Eurostat for United Kingdom.

13. Guaranteeing the future purchasing power of money can have important consequences for the economy. A direct consequence is that it would facilitate long-term planning by reducing the price risk in long-term nominal contracts.[7] Furthermore, as long-run averages of the inflation rate are more certain under price-level (because past deviations are corrected) rather than inflation targeting, it would be expected that inflation risk premiums embedded into long-term rates will be lower in that regime (Crawford *et al.*, 2009).[8] The resulting gains could be substantial given that estimates of the inflation risk premium at a five-year horizon lie in a range from 30 to 110 basis points (Ang *et al.*, 2008; Hördahl, 2008). In turn, a permanent fall in real interest rates would boost aggregate investment ratios and potential growth (Lilico, 2000).

14. A further positive contribution to potential growth would come from the fact that price-level targeting reduces the variability of the real cost of capital (Box Table 1). The reason is that the expectation channel described above reduces the variability of both nominal interest rates and expected inflation, in turn leading to lower real interest rate volatility.

15. Price-level targeting may reduce the optimal level of wage indexation, helping to contain the second-round effects of inflation shocks. When economic agents expect past price increases to be permanent they will tend to request full compensation in order to preserve real wages. But when price hikes are expected to be reversed, compensation would be optimally equivalent to the temporary loss in the purchasing power of wages. This would call for a lower increase than under an inflation targeting regime (Amano *et al.*, 2007).[9]

16. Unanticipated inflation will lead to smaller redistributive effects under price-level rather than inflation targeting (Box 2). The main reason is that economic agents differ in terms of their portfolios, in particular as the young and poor are overrepresented among net borrowers.

Box 2. Redistributive effects under inflation and price-level targeting

Because inflation shocks can erode the long-term real value of nominal assets and liabilities under inflation targeting but less so under price-level targeting, the choice between the two regimes will have distributive implications. Redistribution effects will reflect differences in the portfolio composition across different groups and sectors in the society. In particular, the young middle-class and the poor tend be net borrowers (due mostly to mortgage liability holdings), while the rich and the old tend to be net savers (due to pension and long-term bond holdings). Across sectors, in many developed nations the government tends to be a net borrower while the household sector, as well as the foreign sector, tends to be a net lender.

Because price-level targeting provides a stable nominal anchor in the long term, gains and losses on long-term nominal claims will be attenuated relative to those under an inflation targeting regime. Meh *et al.* (2008) find that redistributive effects can be substantial under inflation targeting. In a model calibrated for the Canadian economy, a one-time positive 1% price-level shock leads to a gross redistribution among households of 5.5% of GDP. As mentioned before, on average, the winners are the young poor and the young middle-class, while the middle-aged workers, the old and the rich are the losers. Moreover, the household sector net wealth loss against the government amounts to 0.4% of GDP under inflation targeting (and is almost three times bigger as under price-level targeting).

7. The size of this benefit is probably limited in practice because if benefits were greater than the transaction costs of indexing, indexed contracts would be more common. However, it should be noted that indexation, especially in wage setting, entails real rigidities which reduce welfare.

8. This result of course assumes that monetary policy is fully credible under price level targeting.

9 . The potential benefit arising from buffering second round effects of inflationary shocks through the attenuation of wage increases is to be gauged against actual indexation practices. Where indexation is not widespread, then this potential advantage will be small.

The authors also analyse the impact on output and welfare of different fiscal policies transferring to households the government's windfall gain or loss. In particular, they study the case of a reduction in labour taxes, lump sum transfers, and a transfer to retirees when a positive price-level shock improves the government's portfolio. As agents are heterogeneous regarding labour productivity and propensities to work and save, different types of fiscal policy transfers will have non-zero effects, despite the fact that the redistribution shock is zero-sum across agents in the economy. For these reasons, there will be non-zero effects even under price-level targeting. As expected from the arguments presented in the main text, the authors find that the impact is much bigger under inflation targeting.

Source : Meh *et al.* (2008).

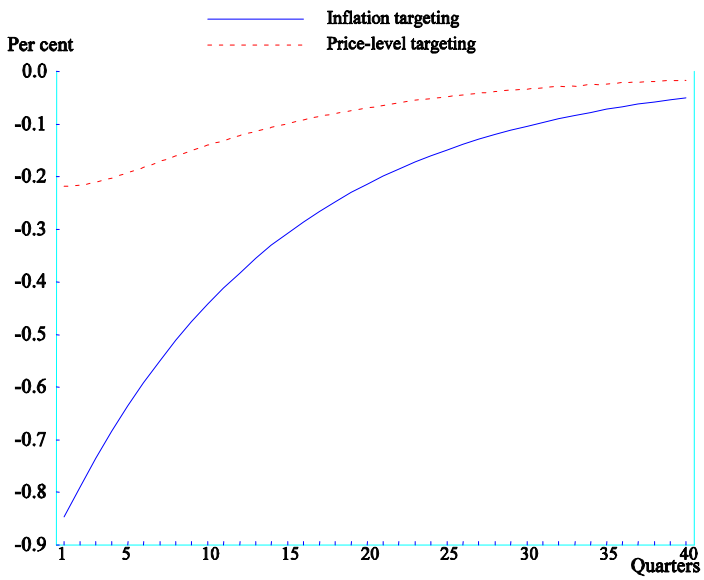
A reduced probability of asset-price bubbles?

17. There are some grounds for supposing that asset price fluctuations may be easier to avoid under price-level targeting than inflation targeting. That would be the case, for example, in a monetary policy easing phase of the cycle in which interest rates can be below neutral for a sustained period of time, for instance following a negative demand shock. As illustrated in Figure 3, the policy easing would be expected to be more aggressive under inflation targeting (because changes in *ex ante* real interest rates occur mainly through changes in nominal rates rather than expected inflation, as mentioned before). In this situation, with substantially lower policy rates over three to five years, an inflation targeting regime might potentially be more likely to generate asset bubbles than a price-level based framework. More generally, including when the economy is also hit by cost-push shocks, price-level targeting reduces the variability of nominal and real interest rates compared with inflation targeting (see Box Table 1), creating an environment where bubbles might be less likely to develop. Drawing a conclusion about asset-price bubbles based on a premise regarding interest rate movements is highly tentative, however, because bubbles, by definition, occur when prices diverge from fundamentals (of which interest rates are a part) and can arise either in or out of phase with movements in the price level itself.[10]

10. The formation of bubbles cannot be studied inside the model underpinning Figure 1. See for instance Ahrend *et al.* (2008) for a discussion of the link between low nominal rates and asset price bubbles and financial market excesses.

Figure 3. Response of the nominal interest rate to a negative demand shock

Figure 1. Response of the nominal interest rate to a negative demand shock



Note : The shock is a 1% of GDP negative demand shock. The policy response is calculated in the benchmark model presented in Box 1.
Source: OECD.

3. Main concerns about price-level targeting

Greater output volatility

18. Central banks are traditionally concerned with the implications of monetary policy for output volatility. The initial conjecture (due to Fisher) was that a price-level targeting regime would induce too much output volatility, implying that an inflation targeting regime should be preferred.[11] The intuition was that, under price-level targeting, monetary policy should strongly react to shocks if it is to ensure that the price level reverts to target, inducing interest rate and output volatility. In contrast, under inflation targeting, central banks will only partially adjust to changes in the price level.

19. In fact, theoretical and simulation results on the impact of the monetary policy regime on output gap volatility give mixed results and depend heavily on the model specification and parameters chosen. In the two simple DSGE models presented in Box 1, compared with inflation targeting, a price-level rule reduces inflation and interest rate volatility but at the cost of greater output variability. Coletti *et al.* (2008) obtain the same conclusion in a more comprehensive setting using the Bank of Canada's model for both Canada and the United States. In Svensson's (1999) highly stylised model, output gap volatility is not affected by the monetary regime, a fact that can be attributed to the absence of an IS curve in the model. In a model where policy is discretionary (meaning that today's decision only aims at maximising today's welfare), Cover and Pecorino (2005) find that price-level targeting also reduces output volatility compared with inflation targeting.

11. All in all, choosing a price-level target would imply a trade-off between output and price volatility.

20. The importance of the degree of forward-looking behaviour of economic agents for the effectiveness of price-level targeting regimes has been extensively analysed in the literature. Williams (2003) studied this issue using the large scale Federal Reserve Board model for the US economy (FRB/US). The author compares the performance of simple monetary policy rules under commitment and finds that the impact of the monetary regime on the volatility of inflation and output changes with the extent of forward-looking behaviour (*i.e.* the degree by which price and wage determination are made with rational expectations about the future rather than following rules based on past outcomes). He shows that, under rational expectations, targeting the price level instead of inflation generates little additional output and inflation volatility, because the expectations channel helps stabilise inflation, reducing at the same time output stabilisation costs. Similar results are obtained by Smets (2003), Guender and Oh (2006) and Vestin (2006).

Possibly greater vulnerability to model uncertainty

21. Price-level targeting may be less robust to model uncertainty than a standard inflation-targeting Taylor rule. Given that the monetary authorities usually have imperfect information about which model parameterisation provides the most adequate description of the economy, it would be desirable for operational purposes to specify monetary policy rules that are robust to uncertainty in those coefficients. This is particularly the case with respect to the degree of forward-looking behaviour of economic agents which is central for the success of a price-level targeting regime. Jääskelä (2005) studies this issue by assuming that the coefficients of policy rules are optimised with respect to a given benchmark model configuration, when the true model of the economy is described by some other parameterisation. In other words, the monetary authority optimises the coefficients of its policy reaction function with respect to a different set of parameters than those governing the true economic structure. The author finds that the performance of price-level targeting deteriorates in terms of both inflation and output fluctuations, implying welfare losses, when consumption and pricing decisions are dominated by strong backward-looking behaviour. The result is primarily due to the fact that the beneficial expectation channel inherent to price-level targeting requires a minimum degree of forward-looking behaviour. Under inflation targeting the value of the loss function is relatively stable, even when the monetary authorities are wrong with respect to the forward-looking behaviour of economic agents. However, the degree of backward-looking behaviour above which price-level targeting starts to underperform a standard inflation rule is very high.[12]

22. Models that combine prevalent backward-looking behaviour with strong exchange rate effects are another illustration of possible situations where price-level rules perform poorly relative to inflation targeting. Batini and Yates (2003) study an open economy where the exchange rate enters a strongly backward-looking Philips curve. In this setting, opening the economy increases inflation and price volatility under both monetary policy regimes, but price-level targeting increases inflation variability relative to inflation targeting. This is because in their model with backward-looking behaviour in price setting and consumption, targeting the price level induces a higher interest rate variance and, through the uncovered interest parity condition, higher exchanges rate volatility than inflation targeting. Indeed, model

12. For instance, in a standard model of price-setting incorporating backward-looking behaviour such as Galí and Gertler's (1999) with an average duration of prices of three quarters or less (as apparent in US and euro area data, see Nakamura *et al.*, 2008 and Dhyne *et al.*, 2006), even if *all but an infinitesimal fraction of firms* are backward looking, the degree of persistence will *not* be high enough to generate a situation where inflation targeting dominates a price-level rule in Jääskelä's (2005) model. For instance, with Gali and Gertler's (1999) structural estimates of the degree of forward-looking behaviour in price setting, the economy is very firmly in the region where price-level targeting clearly outperforms inflation targeting in Jääskelä's (2005) model. However, some reduced-form estimates of the Phillips curve such as Rudebusch's (2002) lie in the range of values where price-level targeting delivers poor results in Jääskela's (2005) model.

uncertainty and the associated effects of imperfectly calibrated policy rules therefore argue in favour of inflation targeting.

Higher burden on central bank credibility

23. The last concern about price-level targeting is that its capacity to maintain price stability by relying on market forces is based on the premise that monetary authorities are fully credible. Using the same argument as before, for expected inflation to rise following a positive supply side shock, economic agents must believe that monetary authorities will forcibly reduce interest rates, so that the price level will increase and will converge to the price level target in the near future. If the price level does not actually converge to the target reasonable quickly, agents may start doubting about the commitment or capacity of central banks to achieve monetary policy objectives. If credibility is lost, faced with an unexpected price level fall, private agents will not revise their expected inflation upwards, and the self regulating mechanism will break. Studying a scenario where the central bank moves from inflation to price-level targeting, Krytsov *et al.* (2008) show that the self regulating mechanism remains weak as long as the public fears that monetary policy could revert to the old regime, that is, when the commitment to the new monetary policy regime is imperfect. In their model, it takes about two and half years before the new price-level regime acquires a degree of credibility sufficient to deliver welfare gains over inflation targeting.

24. Moreover, if central bank credibility is initially low the authorities may be forced to choose a too short monetary policy horizon, in which case welfare losses will be lower under inflation rather than price-level targeting (Smets, 2003). This is because price-level targeting will induce too much output gap volatility as the policy horizon shortens.

25. But even if the monetary authorities already enjoy a high degree of credibility, the fact that price-level targeting is a more demanding monetary regime may end by eroding central bank credibility. Taking the example of a small open economy in which exchange rate shocks tend to occur more frequently than in closed economies, achieving a price-level target may be more difficult than reaching an inflation target. This could threaten the credibility of the policy regime, because the path towards a credible price level target is potentially quite costly. This can be especially the case of developing countries, in which actual and targeted price levels have deviated substantially under inflation targeting. Indeed, in some situations and for some countries, especially for small open economies hit by large terms of trade shocks (such as commodity exporters), it can be optimal to let “bygones be bygones”.

4. Implementation issues

The feedback and policy horizon

26. Central banks aim at reaching price stability over the medium term rather than instantaneously. This is because the transmission mechanism of monetary policy tends to operate with lags and trying to counteract short-term shocks to the price level over which the monetary authorities have only little control may result in higher interest rate volatility and output losses. A gradualist response to shocks may avoid such excessive volatility. The question naturally arises of what is the optimal policy horizon for monetary policy, or in other words, the time frame over which the monetary authorities should intend to bring inflation back to target. Smets (2003) analyses this issue in a small-scale forward-looking model calibrated for the euro area. In his set up, the monetary authority acts under commitment and wishes to minimise both interest rate and output gap volatility, subject to the constraint that it should achieve a given price or inflation target over a specific time horizon. The author finds that, for both inflation and price-level targeting, setting a too short horizon reduces inflation variability at the expense of increasing output gap and interest rate volatility. The intuition behind this result is that, when the horizon is short, central banks

will promptly react to inflationary shocks, making both the monetary tool and the output gap too volatile, but at the same time containing inflationary/deflationary pressures.[13]

27. Smets (2003) also observes that, for a given policy horizon, the variance of output and interest rates is generally greater under price-level targeting, while the variance of inflation is lower. The reason for the first finding is that bringing the price level back to a path is more demanding than bringing inflation back to target. As for the second finding, it was already mentioned that the expectations channel helps stabilising inflation. Indeed, when comparing the optimal policy horizons for both monetary policy regimes, the author finds that it is longer under price-level rather than inflation targeting. This is the case because lengthening the horizon improves the trade off between output gap and inflation volatility.[14]

28. A related but different concept is the optimal forecast or feedback horizon (Batini and Nelson, 2001). This is the horizon over which central banks form inflation forecasts that enter policy rules, *i.e.* the horizon at which the central bank reacts to deviation of expected inflation, or the price level, from the target.[15] As before, Coletti *et al.* (2008) also find that the optimal feedback horizon is longer when the monetary authority targets the price level. Another implementation issue relates to the choice of an optimal band around the price-level target path.

When inflation and price-level targeting are not that different

29. In practice, an inflation targeting regime could be fashioned in such a way that it would look quite similar in operation to a price-level targeting monetary framework. In particular, price-level targeting can be seen as a more aggressive monetary policy rule than inflation targeting in the sense that it magnifies the weight given to correcting inflation deviations. In this respect, Chadha and Nolan (2002) and Coletti *et al.* (2008) show that increasing the weight associated to inflation and reducing that associated to output in the Taylor rule causes the volatility of output and inflation under inflation targeting to converge to that under price-level targeting.

30. This possible equivalence is important because changing the monetary policy framework can involve large transition costs (for example, in terms of communication strategy and compromising credibility). One such communication challenge has to do with announcing different inflation targets for different years. For example, faced with a cost-push shock that causes inflation to overshoot the (implicit or explicit) target, the authorities have to commit to years of inflation below target. This can be especially demanding, if fairly large cumulative deviations between the actual and target paths persist over time. To remain credible, the central bank would have to be very clear on its commitment to attain the target over the medium term. The lack of international experience with price level targeting, analysed in the next section, may also undermine credibility during initial implementation phases because it would increase learning costs. All of this would make the central bank's communication strategy more complex under price level rather than inflation targeting and would require an effective communication policy in order to ensure a smooth transition between the two regimes.

31. Nevertheless, while the outcomes under both monetary policy regimes can be very similar *ex post*, an aggressive inflation targeting policy would lose the *ex ante* automatic stabilisation benefit attached

13. It should be noted that the model presented in Box 1 does not impose any restriction on converge to target, in contrast to Smets' (2003) model. Indeed, the impulse response functions presented in Figure 3 should not be interpreted as indicating any optimal forecast horizon.

14. In fact, the optimal horizon under a price level objective will be twice as long as the one for inflation targeting, also reducing the strength of the expectations channel.

15. For example, central banks may react to deviations of expected inflation from the target for the next year, or between the next year and the following one.

to price level targeting. As a result, in an environment where a minimum share of decision makers are forward looking, aggressive inflation targeting can achieve the same price dynamics as price-level targeting only at the cost of greater real interest rate volatility.

Limited historical experience[16]

32. In Sweden, output losses during the monetary experience after World War I and the world-wide depression that started in 1928 undermined the legitimacy of the gold standard. A price-level targeting regime was adopted in September 1931, after leaving the gold standard. The new monetary programme was widely supported by the economics profession and aimed principally at arresting the fall in prices that was characteristic of the end of the 1920s. The potential risk of price increases, after the floating of the *krona*, was not excluded though.

33. When the new monetary policy regime was first launched in September 1931, it was only accompanied by a short statement on the part of the monetary authorities saying the central bank will aim at preserving the purchasing power of the *krona*. A full-fledged programme was only completed in May 1932, after eight months of deliberations among the central bank, leading monetary economists, the Parliament and the general public. The main constituent points of the programme were the following: *i*) monetary policy should aim at resisting both inflation and deflation; *ii*) the objective should be to restore price levels prevailing at the end 1931; a return to the price level of 1928-29 (before the fall in prices) was not recommended because this would imply a too loose monetary policy, leading to, eventually, inflation and nominal wage spirals[17]; *iii*) monetary policy should not target any particular price index, so that a simple or formal rule did not appear feasible (the central bank should also monitor the wholesale price index and raw materials prices); nevertheless, for operational purposes, the Riksbank started elaborating a weekly consumer price index; and *iv*) the floating of the *krona* was announced to be temporary, and a return to gold should be aimed at, as soon as internal and external conditions would permit it. Indeed, Sweden became the only country to have a price-level objective. A summary and some more details on price-level targeting in Sweden are presented in Table 1.

34. Both the consumer and the wholesale price indices fell sharply from 1928 until 1932-33 (Figure 4). This reflected the transmission of international deflationary pressures from the gold standard mechanism. When Sweden left the gold standard in 1931, it initially adopted a floating exchange rate system. For fears of inflation, the Riksbank initially adopted a tight monetary policy (Figure 5), increasing nominal interest rates from 6 to 8%. As a consequence, economic activity fell and unemployment rose over the short run. Monetary policy was subsequently eased to counteract the contraction in economic activity, reaching a minimum of 2.5% in 1934, where it remained until the outbreak of the Second World War. Regarding exchange rate dynamics, the *krona* depreciated trough 1932-33, when it became obvious that a return to a gold standard was not a valid alternative, prompting the central bank to peg the *krona* to the British pound. All in all, wholesale prices increased sharply while consumer prices increased steadily starting in 1933.

16. See Berg and Jonung (1999) for a more detailed description.

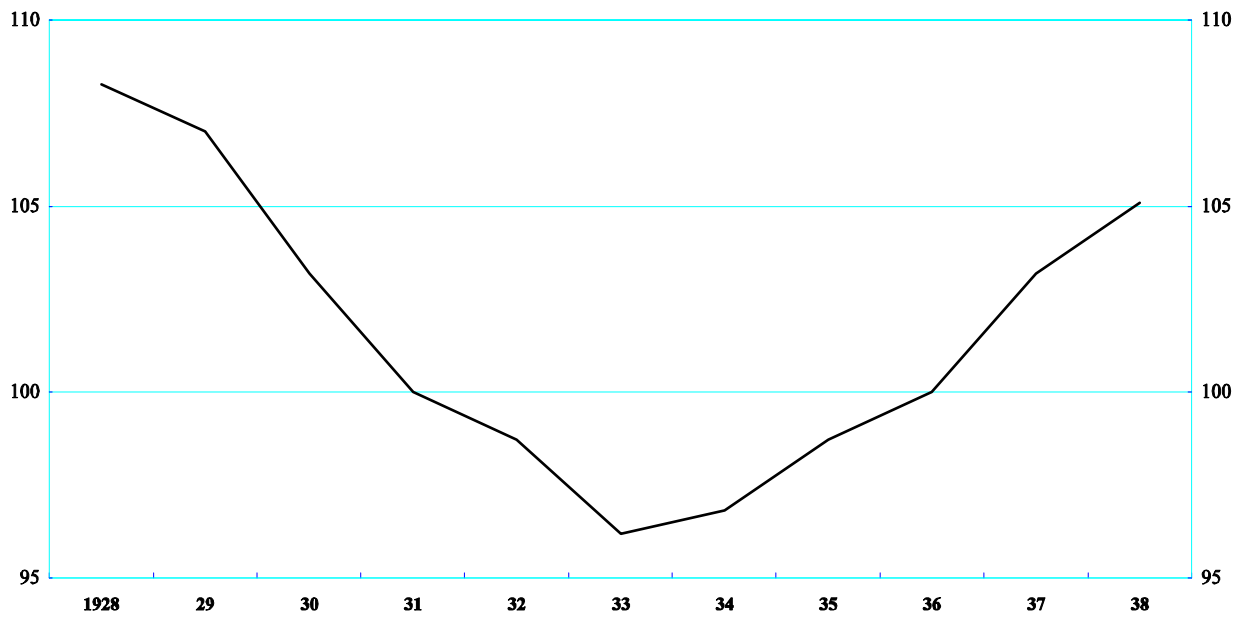
17. Interestingly, increases in the price level coming from custom duties, other taxes, seasonal price changes, etc. were thought to be consistent with the monetary policy programme and would not require any reaction from the monetary authority.

Table 1. The Swedish experience with price-level targeting

Feature	Description
Introduction/adoption	Immediately following the suspension of the gold standard (September 27, 1931). One sentence declaration
Main reason for adoption	Deflation
Evolution of policy framework	Monetary Programme passed by Riksdag (Parliament) in May 1932
Legal framework	No change in Charter of Riksbank preceding or following switch of monetary regime
Relevant price index	Weekly consumer price index and other price indices such as wholesale prices and prices of raw materials
Most important operational target at time of adoption	Average level of consumer goods prices as of September 1931
Caveats	Indirect taxes and seasonal factors
Temporal vs. permanent strategy	Temporary as eventual return to gold standard was envisaged
Policy instrument	Discount rate; operations in foreign exchange market; explicit announcements
Role of exchange rate	Peg of the *krona* to *pound* from July 1933 to start of WW II
Role of monetary aggregates	No explicit mentioning in Monetary Programme
Goal independence	Goals were set by Riksdag
Instrument independence	Yes
Accountability	No specific mentioning of sanctions in case policy goal was missed

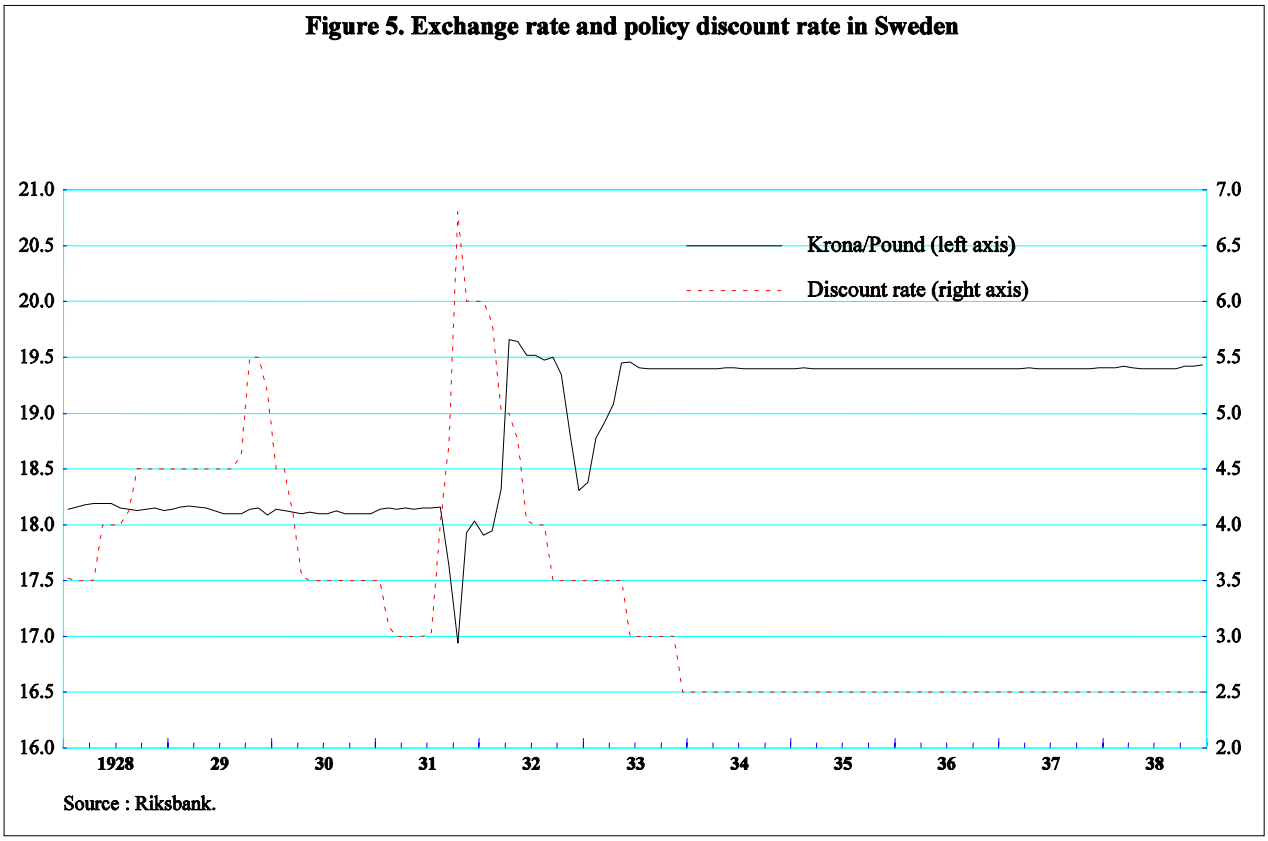
Source: Guender and Oh (2006).

Figure 4. The evolution of the CPI in Sweden, before and after price-level targeting
Index 1931=100



Source: Riksbank.

Figure 5. Exchange rate and policy discount rate in Sweden



Source: Riksbank.

35. Whether or not the monetary programme was successful in preventing further deflation in Sweden is difficult to gauge given that: *i*) there was no commitment to a specific policy horizon against which to evaluate the success of monetary policy; *ii*) the central bank decided to peg the *krona* to the pound, raising the question as to what extent the goal of monetary policy was effectively to stabilise the price level; price and exchange rate dynamics in the United Kingdom were then key for the success of the Swedish programme; and *iii*) interest rate policy seems to have followed other countries like the United Kingdom and the United States, suggesting that the economic recovery and inflation were driven primarily by global factors.

BIBLIOGRAPHY

Ahrend, R., B. Cournède and R. Price (2008), "Monetary Policy, Market Excesses and Financial Turmoil," *OECD Economics Department Working Papers*, No. 597, OECD.

Amano, R., S. Ambler and P. Ireland (2007), "Price Level Targeting, Wage Indexation and Welfare", unpublished manuscript.

Ambler, S. (2009), "Price-Level Targeting and Stabilization Policy: A Review," *Bank of Canada Review*, Spring.

Ang, A., G. Bekaert and M. Wei (2008), "The Term Structure of Real Rates and Expected Inflation", *The Journal of Finance*, Vol. LXIII, No. 2, pp. 797-849.

Ang, A., G. Bekaert and M. Wei (2008), "The Term Structure of Real Rates and Expected Inflation", *The Journal of Finance*, Vol. LXIII, No. 2, pp. 797-849.

Angeris, A. and P. Arestis (2008), "Assessing Inflation Targeting through Intervention Analysis", *Oxford Economic Papers*, Vol. 60, pp. 293–317.

Aoki, M. and H. Yoshikawa (2006), "Uncertainty, Policy ineffectiveness, and Long stagnation of the Macroeconomy," *Japan and the World Economy*, Vol. 18, pp. 261-272.

Batini, N. and A. Yates (2003), "Hybrid Inflation and Price-Level Targeting", *Journal of Money*, Credit and Banking, Vol. 35, No. 3, pp. 283-300.

Batini, N. and E. Nelson (2001), "Optimal Horizons for Inflation Targeting", *Journal of Economic Dynamics & Control*, Vol. 51, pp. 891-910.

Benati, L. (2008), "Investigating Inflation Persistence across Monetary Regimes", *The Quarterly Journal of Economics*, Vol. 123, No. 3, pp. 1005-60.

Berg, C. and L. Jonung (1999), "Pioneering Price Level Targeting: The Swedish Experience 1931-1937", *Journal of Monetary Economics*, Vol. 31, pp. 525-51.

Bernanke, B. and V. Reinhart (2004), "Conducting Monetary Policy at Very Low Short-Term Interest Rates," *AEA Proceedings and Papers*, Vol. 94 No. 2.

Blanchard, O. and C. Khan (1980), "The Solution of Linear Difference Models under Rational Expectations," *Econometrica*, Vol. 48, No. 5, pp. 1305-1311.

Calderón, C. and K. Schmidt-Hebbel (2008), "What Drives Inflation in the World?", *Working Paper*, No. 491, Central Bank of Chile, Santiago.

Chadha, J.S. and C. Nolan (2002), "Inflation and Price Level Targeting in a New Keynesian Model", *The Manchester School*, Vol. 70, No. 4, pp. 570-95.

Coletti, D. R. Lalonde and D. Muir (2008), "Inflation Targeting and Price-Level-Path Targeting in the Global Economy Model: Some Open Economy Considerations", *IMF Staff Papers*, Vol. 55, No. 2, International Monetary Fund, Washington, DC.

Cover, J.P. and P. Pecorino (2005), "Price and Output Stability under Price-Level Targeting", *Southern Economic Journal*, Vol. 72, No. 1, pp. 152-66.

Crawford, A., C. Meh and Y. Terajima (2009), "Price-Level Uncertainty, Price-Level Targeting and Nominal Debt contracts," *Bank of Canada Review*, Spring.

Dhyne, E. *et al.* (2006), "Price Changes in the Euro Area and the United States: Some Facts from Individual Consumer Price Data," *Journal of Economic Perspectives*, Vol. 20, No. 2, pp. 171-192.

Fatás, A., I. Mihov and A.K. Rose (2006), "Quantitative Goals for Monetary Policy", *Working Paper*, No. 615, European Central Bank, Frankfurt.

Galí, J. and M. Gertler (1999), "Inflation Dynamics: a Structural Econometric Analysis," *Journal of Monetary Economics*, Vol. 44, pp. 195-222.

Galí, J. (2008), *Monetary Policy, Inflation and the Business Cycle*, Princeton University Press.

Galí, J., M. Gertler and D. López-Salido (2007), "Mark-ups, Gaps and the Welfare Costs of Business Fluctuations," *Review of Economics and Statistics*, Vol. 89, No. 1, pp. 44-59.

Guender, A. and D.Y. Oh (2006), "Price Stability through Price-Level Targeting or Inflation Targeting? A Tale of Two Experiments", *Journal of Economics and Business*, Vol. 58, pp. 373-91.

Hördahl, P. (2008), "The Inflation Risk Premium in the Term Structure of Interest Rates", *BIS Quarterly Review*, September.

Jääskelä, J.P. (2005), "Inflation, Price Level and Hybrid Rules under Inflation Uncertainty", Scandinavian Journal of Economics, Vol. 107, No. 1, pp. 141-56.

Kryvtsov, O., M. Shukayev and A. Ueberfeldt (2008), "Adopting Price-Level Targeting under Imperfect Credibility: An Update", *Working Paper*, No. 37, Bank of Canada.

Lilico, A. (2000), "Price-Level Targeting – The Next Objective for Monetary Policy?", *Institute for Economic Affairs*, Oxford.

Meh, C.A, J-V. Ríos-Rull and Y. Terajima (2008), "Aggregate and Welfare Effects of Redistribution of Wealth Under Inflation and Price-Level Targeting", *Working Paper*, No. 31, Bank of Canada, Ottawa.

Mishkin, F. and K. Schmidt-Hebbel (2001), "One Decade of Inflation Targeting in the World: What do We Know and What do We Need to Know?, *NBER Working Paper*, No. 8397, National Bureau of Economic Research, Cambridge, MA.

Mishkin, F. and K. Schmidt-Hebbel (2007), "Does Inflation Targeting Make a Difference?, *NBER Working Paper*, No. 12876, National Bureau of Economic Research, Cambridge, MA.

Nakamura, E. and J. Steinsson (2008), "Five Facts about Prices: a Reevaluation of Menu Cost Models," *The Quarterly Journal of Economics*, Vol. 123, No. 4, pp. 1415-64.

Parkin, M. (2009), "What is the Ideal Monetary Policy Regime?", *CD Howe Institute Commentary*, No. 279.

Rudebusch, G. (2002), "Assessing Nominal Income Rules for Monetary Policy with Model and Data Uncertainty", *Economic Journal*, Vol. 112, pp. 402–32.

Smets, F. (2003), "Maintaining Price Stability: How Long is the Medium Term", *Journal of Monetary Economics*, Vol. 50, pp. 1293-1309.

Smets, F. and R. Wouters (2003), "An Estimated Stochastic Dynamic General Equilibrium Model of the Euro Area," *Journal of the European Economic Association*, Vol. 1, No. 5.

Svensson, L.E.O. (1999), "Price-Level Targeting versus Inflation Targeting: A Free Lunch?", *Journal of Money, Credit and Banking*, Vol. 31, No. 3, pp. 277-95.

Vestin, D. (2006), "Price-Level Versus Inflation Targeting", *Journal of Monetary Economics*, Vol. 53, pp. 1361-76.

Williams, J.C. (2003), "Simple Rules for Monetary Policy", Federal Reserve Board of San Francisco, *Economic Reviews*.

Woodford, M. (2008), *Interest and Prices*, Princeton University Press.

Yun, T. (1996), "Nominal Price Rigidity, Money Supply Endogeneity, and Business Cycles," *Journal of Monetary Economics*.

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