A Supplement to the Monetary Policy Framework Report

The Divine Coincidence in New Keynesian Theory: Is Targeting Inflation and the Output Gap Essentially the Same?

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Summary

This technical supplementary note examines the standard New Keynesian model that assumes targeting inflation or the output gap have equivalent outcomes for monetary policy.[1] As achieving one of these two central bank mandates implies achieving the other in this model, this equivalence is called the 'divine coincidence'. If this coincidence holds empirically, a single price stability or output (employment) gap mandate would be expected to achieve the same outcome as a dual price stability/output gap mandate. This note discusses the assumptions under which the divine coincidence holds and when it breaks down as viewed in the literature.

The note finds that the divine coincidence breaks down if a variety of restrictive assumptions surrounding firm costs/production and labour market dynamics in the New Keynesian model are relaxed. These breakdowns suggest that monetary policymakers will encounter circumstances under which there will be trade-offs between inflation and employment. Thus the 'divine coincidence' cannot always be relied on to jointly deliver both price and employment stability through optimal monetary policy. Equivalently, outcomes under a single price or employment mandate cannot be expected to always deliver the same outcomes as a dual inflation/employment mandate.

1- What is the divine coincidence?

A core area of research in monetary theory is the relationship between inflation and unemployment. Phillips (1958) showed, using a century of UK data, that inflation and unemployment are inversely related. This relationship came to be known as the Phillips curve. The Phillips curve was shortly confirmed to hold using data from many other countries, including New Zealand.

However, there is much debate over this relationship. Various schools of economic thought view the relationship between the two variables considerably differently. Monetarists such as Phelps (1967) and Friedman (1968) claim that the Phillips curve only holds in the short run. Under certain assumptions of the Rational Expectations Theory, the curve does not hold in the short run either.

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[1] 'Standard Model in this note refers to the New Keynesian Trinity Model.

These diverse theoretical views of the relationship between inflation and unemployment have manifested in a variety of mathematical representations of the Phillips Curve. In a standard New Keynesian framework, the short-term Phillips Curve is expressed as:

$$\pi_t = \beta E(\pi_{t+1}) + \alpha(y - y^*)$$

where π_t is inflation, $E(\pi_{t+1})$ is expected inflation, y is output, y^* is potential output,[2] and $(y - y^*)$ is the output gap. The equation simply states that today's inflation is explained by expected inflation and the welfare-relevant output gap. The 'output gap' closes when the potential output equals the actual output (when the economy works at full capacity). Assuming that an output gap of zero occurs at full employment, the relationship above can be viewed in terms of employment as well.

In this model, stabilising the output gap by setting $y = y^*$ will also result in inflation being stabilised. Similarly, the best approach to stabilising the output gap is to keep inflation unchanged. Achieving one of these objectives will also achieve the other. Importantly, this divine coincidence still holds in this model in the case of supply shocks, such as a change in oil prices, productivity, or any other supply-side shocks. This is because both y* and y are affected by supply shocks. In the model, the optimal response to even a temporary price shock, such as an increase in oil prices, is to stabilise inflation.

If the divine coincidence holds empirically, a single mandate (based on either price stability or full employment) or a dual price stability/full employment mandate would deliver the same outcomes as they would be 'two sides of the same coin'. The question is: to what extent does the divine coincidence hold?

2- To what extent does the divine coincidence hold?

Several studies show that the divine coincidence occurs largely due to a number of restrictive assumptions in the New Keynesian framework, which relate to the assumption of fixed parity between 'potential' output and 'efficient' output. However, this assumption breaks down under a variety of conditions.

Firm-level dynamics

Benigno and Woodford (2005) show that the constancy between potential and efficient output breaks down if there are changes in tax rates over time, thereby breaking the divine coincidence. The same happens by introducing time varying wage mark-ups. Ravenna and Walsh (2006) extend the New Keynesian model by allowing the nominal interest rate to affect the marginal cost of firms. The findings suggest that the introduction of this relationship between monetary policy and firm production cost also breaks the divine coincidence.

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[2] 'Potential output', also known as 'natural output', is the equilibrium level of output that would prevail under imperfect competition if prices and wages are flexible. This compares to 'efficient output', the level of output that would prevail under perfect competition. The latter is the level of output that maximises public welfare.

Alves (2014) shows that the divine coincidence only holds in special cases, such as when monetary policy stabilises the inflation rate at zero, or when firms set wages perfectly in line with inflation changes when not re-optimising their prices in line with equilibrium wages. Finally, Kim (2016) shows that, even without real wage rigidities, supply shocks create a trade-off between stabilizing inflation and stabilizing the output gap if the elasticity of substitution between non-produced inputs and labour is less than unity.

Labour market dynamics

Blanchard and Galí (2007) show that the coincidence holds in standard New Keynesian models only because there are no real (i.e. non-monetary) imperfections in these models. For example, Blanchard and Galí (2007) introduce real wage rigidities[3] into the model and show that the coincidence disappears when wages do not adjust to a change in other economic variables, e.g. changes in prices, such as an oil price shock, or unemployment.[4] Hall (2005) shows that real wage rigidity is essential for building models that better reproduce labour market facts.

3- Conclusions

The above literature suggests that the divine coincidence is largely a product of restrictive assumptions used in building the standard New Keynesian model. Relaxing these assumptions across a variety of labour and firm-level conditions results in a breakdown of the coincidence. These breakdowns suggest that there will be occasions where monetary policy decision-makers encounter trade-offs between price and employment stability. These findings are consistent with the observation of Alves (2014), who finds that most central banks perceive a trade-off or imperfect matching between stabilising inflation and the output/employment gap, and underpin the conclusion that strict inflation targeting can result in larger decreases in employment than is optimal in the face of certain price shocks.

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[3] Real wages are called 'rigid' when they do not fully adjust to the wage level suggested by the equilibrium. Several theories have been put forward to explain such a disparity. For instance, firms might want to pay higher wages for more productive workers to incentivise them.

[4] What they particularly show is that stabilising inflation is no longer equivalent to stabilising the gap between the efficient output and actual output.

References

Alves, S. A. L. (2014). Lack of divine coincidence in New Keynesian models. *Journal of monetary Economics, 67*, 33-46.

Benigno, P., & Woodford, M. (2005). Inflation stabilization and welfare: The case of a distorted steady state. *Journal of the European Economic Association, 3*(6), 1185-1236.

Blanchard, O., & Galí, J. (2007). Real wage rigidities and the New Keynesian model. *Journal of money, credit and banking, 39*(s1), 35-65.

Friedman, M. (1968). The role of monetary policy. *The American economic review, 58*(1), 1-17.

Hall, R. E. (2005). Employment fluctuations with equilibrium wage stickiness. *American economic review, 95*(1), 50-65.

Hickey, B. (2017). RBNZ wary of Robertson's jobless target. *Newsroom*.

Kim, B.-G. (2016). Supply shocks and the divine coincidence. *Economics Letters, 145*, 210-213.

Phelps, E. S. (1967). Phillips curves, expectations of inflation and optimal unemployment over time. *economica*, 254-281.

Phillips, A. W. (1958). The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1861–1957. *economica, 25*(100), 283-299.

Ravenna, F., & Walsh, C. E. (2006). Optimal monetary policy with the cost channel. *Journal of monetary Economics, 53*(2), 199-216.

Spencer, G. (2017). Low inflation and its implications for monetary policy. *A speech delivered to the Institute of Directors in Auckland*.