10-2014

Wage Subsidies as a Tool to Fight Recessions

Hian Teck HOON
Singapore Management University, hthoon@smu.edu.sg

Published in Macroeconomic Review, 2014 October, Volume XIII, Issue 2, pages 91–96.

Wage Subsidies as a Tool to Fight Recessions

by Hoon Hian Teck[1]

"First, we need to reduce our business costs, to help viable companies tide over the crisis and minimise unemployment. The significant currency re-alignments have affected our cost competitiveness. We should take prompt measures to reduce business costs directly, including wage costs, to restore our position."

— *Committee on Singapore's Competitiveness*, November 1998

Introduction

Since 1981, MAS has used the exchange rate as the primary tool of macroeconomic stabilisation. As discussed in another Special Feature by Ilian Mihov in the April 2013 issue of the *Review*, an exchange rate-based policy rule not only describes very well Singapore's actual conduct of monetary policy but it has also delivered reduced volatility in inflation and output.[2] Yet, as the quotation above suggests, during the onslaught of the contagion effects arising from the 1997–98 Asian Financial Crisis when Singapore's export demand declined precipitously, threatening a rise in the unemployment rate, exchange rate adjustment did not act alone to counteract the decline in aggregate demand (AD). Instead, the committee set up by then-Prime Minister Goh Chok Tong recommended a big reduction in wage costs as an additional tool to fight the recession. Indeed, in two other major recessionary episodes that hit post-independence Singapore—the 1985–86 recession and the fallout from the 2008–09 Global Financial Crisis—reducing wage costs was a major policy tool to stabilise the economy.

The policy Singapore adopted in response to a significant decline in AD, namely, implementing a national programme of lowering wage costs, is somewhat uncommon—both among emerging and developed economies. Suppose an economy is hit by a recessionary shock that causes a fall in AD.[3] Economies that follow a conventional Taylor rule would progressively lower the short-term nominal interest rate to spur AD, both by effectively lowering the real interest rate and by weakening domestic currencies as international capital flows out (under a flexible exchange rate regime). Conventional fiscal policy takes the

---

[1] Hoon Hian Teck is Professor of Economics and Associate Dean at the School of Economics, Singapore Management University. The views in this Special Feature are solely those of the author and should not be attributed to MAS.

[2] Professor Mihov used quarterly data for Singapore from Q1 1981 to Q4 2012 to estimate the policy rule, or the central bank's reaction function, by relating the change in the exchange rate to deviations of the inflation rate from an implicit inflation target and the size of the output gap, which refers to the deviation of actual GDP from potential GDP. Relative to a conventional Taylor rule, the volatility of inflation and output was found to be only a fifth as large.

[3] I mean by a fall in AD a leftward shift of the whole AD schedule in the conventional price-output plane.

form of boosting AD either directly, by increasing government purchases or indirectly, by a cut in income taxes.[4] It is not often the case that a programme to directly reduce wage costs would be a centrepiece of a national economic recovery effort.

The question then arises: how does the use of wage subsidies—the term for lowering wage costs through policy intervention—fit into the corpus of macroeconomic theory?[5] In particular, since the seminal work on micro-foundations for macroeconomics, summarised in the Phelps *et al*. (1970) volume, the Phillips curve relationship or aggregate supply (AS) curve is derived from the optimising decisions of all economic agents—both producers and employees. How does the introduction of a wage subsidy scheme during a recession affect the decision of firms with regard to hiring and the decision of employees with regard to quitting? How does the producer adjust its mark-up in response to the implementation of a wage subsidy scheme? In this Special Feature, I first study the theoretical results of implementing a wage subsidy scheme in a model economy featuring both labour turnover (or quitting) and variable mark-ups.[6] Then, I present a case study of Singapore's experience with using wage subsidies to fight recessions by taking a preliminary look at relevant data.

Effects of a Wage Subsidy in the Model Economy

There are two main features of the model economy I would like to use to analyse the theoretical effects of introducing a wage subsidy scheme to fight recessions: dispersed information and the absence of a "Walrasian" auctioneer. Without a fictitious Walrasian auctioneer to call out prices to clear markets instantaneously, each firm must adopt a wage policy (to combat quitting) and a product pricing policy. The result is that job rationing—hence involuntary unemployment—emerges and price-marginal cost mark-ups vary as firms exercise their market power. As information is dispersed, no single economic actor initially knows what the others in the economy know. Yet, in setting wages and product prices, each firm does not want to be caught paying its employees too little (for fear of precipitating labour turnover) or charging its customers too much (for fear of losing market share). The consequence of the dispersed information, also called incomplete information, is that each firm often gets its expectations of wages and prices prevailing elsewhere in the economy wrong—a state of expectational disequilibrium. So long as the economy is in such a state, the actual unemployment rate will deviate from the natural rate of unemployment.

---

4 By increasing disposable income, households, particularly those that are liquidity-constrained, are encouraged to increase their expenditure. Fiscal policy might also take the form of investment tax credits, which stimulate investment spending. All these tax measures have the feature that they are aimed at boosting AD, that is, at shifting the AD schedule to the right.

5 Terms synonymous with wage subsidies include employment subsidies and jobs credits. A wage subsidy lowers the marginal cost of employing a worker. In the scheme studied in this Special Feature, the reduction in, say, hourly wage cost is applied to all employees on the firm's payroll.

6 The analysis here builds upon work reported in Hoon and Phelps (1992, 2003, 2008). All these papers focus on the effects of shocks and policy changes on the natural rate of unemployment, that is, the rate of unemployment that prevails when the economy is producing at its potential output level. With the objective of understanding the effects of a wage subsidy scheme on the output gap, I introduce to the "natural rate" model of the aforementioned papers those features that can cause the actual unemployment rate to deviate, at least temporarily, from the natural rate of unemployment.

There is a certain rhythm in the model economy with regard to when wages are set and pricing decisions are made. Wages are typically set a year before any new pay adjustment occurs. Product prices may be adjusted more often than once a year but typically not on a daily basis.[7] Moreover, the dates for wage and price setting occur throughout the year in a non-synchronous manner. The result of the staggering of wage and price setting throughout the year is that, even when information flow has become reasonably complete, the economy exhibits some form of nominal wage and price stickiness. In response, say, to a negative AD shock, average wages and prices do not immediately fall by enough to restore the economy to its potential output level. Wage and price staggering, therefore, imparts to the economy persistence in the output gap; hence, a recession can become a long-drawn affair in the absence of any policy intervention.

It is now helpful to go through some preliminary steps to derive the AS schedule in the model economy since a wage subsidy effectively works through a shift in the AS curve. A representative firm has to make three decisions: set a wage to minimise labour turnover; determine the level of employment; and choose the optimal mark-up of price over marginal cost. Choosing the optimal wage leads to an equation that makes the firm's real supply wage, $(W^h/P)_s$, an increasing function of the wage expected to be paid elsewhere in the economy relative to the firm's own wage, (W^{he}/W^h), as well as the employment rate, $(1-u)$. Determining the profit-maximising level of employment leads to an equation that makes the firm's real demand wage, $(W^h/P)_d$, a decreasing function of (W^{he}/W^h), $(1-u)$, the real interest rate, r, and gross mark-up, m, and an increasing function of the wage subsidy expressed in real terms, s^f. Essentially, in the familiar real wage-employment rate plane, the real supply wage schedule is upward-sloping and is shifted up by an increase in the wage expected elsewhere relative to the firm's own wage. The real demand wage schedule, on the other hand, is downward-sloping; it is shifted down by an increase in the real interest rate and the gross mark-up, but is shifted up by an increase in the wage subsidy.

The real supply wage schedule, or wage curve, takes the place of an upward-sloping labour supply curve in neoclassical analysis—it gives the firm's optimal incentive wage required to minimise total costs at any given employment rate, after taking into account the problem of labour turnover. The real demand wage schedule or labour demand curve is downward-sloping because a tighter labour market leads to more rampant quitting. As a result, each firm needs to devote more resources to providing firm-specific training for new hires (to replace those who quit), thus reducing the wage that it can then afford to pay its employees and still remain profitable.

It remains to ask what determines the gross mark-up? In the customer-market model originally introduced by Phelps and Winter (1970), the gross mark-up is an increasing function of the product price expected to be charged elsewhere in the economy relative to the firm's own product price, (P^e/P), and a decreasing function of the shadow value attached to an additional customer, q.[8] The latter, in turn, is given by the present discounted value of the stream of monopoly profits derived from investing in an additional customer. We express the gross mark-up as: $m = \varphi(P^e/P, q)$.

Equating the real supply wage to the real demand wage, and noting that the real marginal cost (RMC) is the inverse of the mark-up, we can write:

$$RMC = \mu\left(\frac{W^{he}}{W^h}, 1-u, r, s^f\right) = \frac{1}{\varphi\left(\frac{P^e}{P}, q\right)} \quad (1)$$

where the first expression is the equilibrium real wage divided by the marginal physical product of labour. What equation (1) gives us is, in effect,

---

[7] See Klenow and Malin (2011) for a recent survey of the microeconomic evidence on price-setting and Taylor (1999) for evidence on wage-setting.

[8] In the Phelps-Winter customer-market model, each customer is an asset to the firm.

an upward-sloping AS schedule in the price-employment rate plane. Juxtaposing a downward-sloping AD schedule in the same plane determines P and $(1-u)$, given P^e, (W^{he}/W^h), q, r, and s^f.

Suppose that the economy is initially producing at potential output and there is a fall in AD. Due to dispersed information as well as nominal wage and price stickiness, the rate of unemployment rises above the natural rate of unemployment and the recession persists. In this environment, an increase in the wage subsidy acts to shift the AS schedule to the right. This is because the wage subsidy drives a wedge between the real demand wage and the real supply wage, on the one hand, and it also gives firms an incentive to reduce mark-ups, on the other hand. We can call this channel through which the wage subsidy operates a "boosting of labour demand" channel.

Two other channels through which a wage subsidy scheme to fight recessions might minimise unemployment and boost employment are: (a) "cash-flow channel" and (b) "signalling channel". In the cash-flow channel, the provision of wage subsidies enables firms that are credit-constrained, but are otherwise healthy, to avoid going bust during the recession. Hence, layoffs are avoided. In the signalling channel, the policy-makers, who possess superior data, can signal that a shock is not industry- or sector-specific, but is in fact economy-wide in its impact. By implementing a national wage subsidy scheme, they convey information to firms that help to narrow the expectational disequilibrium.

Case Study of 1997–98 and 2008–09 Recessions

Export demand for Singapore's goods and services fell by 4.4% in 1998 compared to 1997, while GDP also contracted. Likewise, export demand fell by close to 8% when the economy went into a recession in 2009. Both these recessionary episodes can be attributed in large part to a fall in external demand. In response, the government cut the Central Provident Fund (CPF) contribution rate for employers from 20% in 1998 to 10% in 1999 and 12% in 2000. In the latter episode, it implemented a Jobs Credit Scheme (JCS) in January 2009 that ran for a year and a half, which effectively lowered labour costs by about 12%, subject to a monthly wage cap of S$2,500 per worker.

The lowering of wage costs through a cut in employers' CPF contribution rates and the granting of jobs credits to firms should, as our theoretical analysis suggests, shift out the AS schedule along a given downward-sloping AD schedule. Even at an unchanged exchange rate, the resulting lower unit labour cost (ULC) should raise international competitiveness and partially offset the initial fall in export demand. This channel is likely to be more important in sectors with higher export shares. Direct exports make up over 60% of manufactured output, so wage subsidies would be relatively more important in boosting the manufacturing sector. If the channels highlighted here are operative, we should also expect to see, with the introduction of wage subsidies, a boost to export demand coming from cheaper manufactured products.

Chart 1 shows measures of Singapore's international competitiveness from 1996–2013. We note that wage subsidies have the biggest effect on the ULC in the manufacturing sector, reducing the index from 100 in 1998 to 84.7 in 1999 and 81.9 in 2000, and then reducing it from 85.0 in 2008 to 81.4 in 2009 and 68.6 in 2010.[9] For the overall economy, the index went down from 105.7 in 1998 to 98.1 in 1999 and 100.1 in 2000, and increased slightly from 105.2 in 2008 to 106.0 in 2009 before declining to 102.5 in 2010.

The S$ nominal effective exchange rate (S$NEER) played a complementary role in boosting international competitiveness. The Singapore dollar was allowed to weaken against the basket of currencies of its main trading partners, going from 103.7 in 1998 to 98.5 in 1999 and 98.7

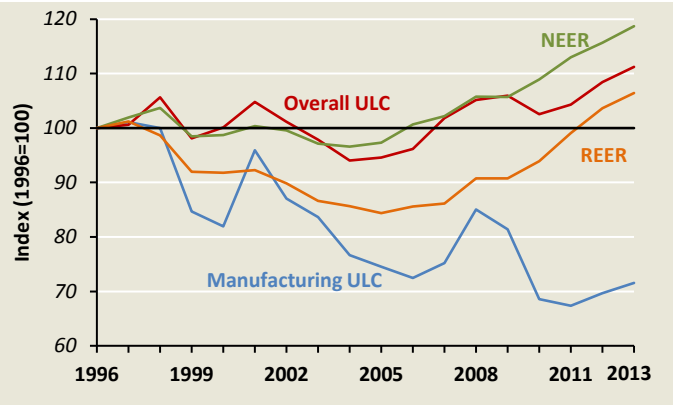
[9] The index is set to 100 in 1996.

in 2000. However, there was little change in the S$NEER from 2008 to 2009 and, in fact, it strengthened slightly from 2009 to 2010.[10] Calculated based on the CPI, the S$ real effective exchange rate (S$REER) showed a decline from 98.6 in 1998 to 92.0 in 1999 and 91.8 in 2000. It stayed unchanged at 90.8 in 2008 and 2009 and actually increased to 93.9 in 2010. However, it is noteworthy that the price index for Singapore's manufactured products, which might be a better index to use than the CPI to reflect international competitiveness, shows a decline from 107.4 in 2008 to 93.0 in 2009 and 94.6 in 2010.[11]

Export demand grew by 7.8% in 1999 compared to 1998 and by 17.4% in 2010 compared to 2009. Real GDP also showed a strong rebound, growing at 6.1% in 1999 and 8.9% in 2000; it expanded by over 15% in 2010 after registering negative growth in 2009.

How well does the experience of the recoveries from the 1997–98 and 2008–09 recessions match the predictions of the theory described above? The initial shock causing a decline in export demand was mainly a fall in income in Singapore's trading partners—mainly Asia during the 1997–98 recession and the US and Europe during the 2008–09 recession. If Singapore's recovery was due to a pickup in GDP of its trading partners, the AD schedule would shift right along a given AS schedule. In fact, the rapid recovery of export demand occurred despite the slow recovery of the trading partners' GDP. This suggests that the boost in export demand came from the increase in international competitiveness brought about by the wage subsidies, which lowered ULC, especially in manufacturing. As a result, it was the AS schedule that shifted right along a given AD schedule.

Chart 1
Singapore's International Competitiveness
1996–2013



Source: DOS, IMF

[10] The index is set to 100 in 1996. The index was 105.8 in 2008, 105.7 in 2009 and 108.9 in 2010.

[11] The index is set to 100 in 2012. See Table 19.5 of DOS (2014).

Sum-up

While the adoption of an exchange rate-based policy rule by the MAS since 1981 describes very well the actual conduct of monetary policy and has delivered reduced volatility in inflation and output, a look at how the Singapore government responded to the major recessionary shocks suggests that more than one policy tool was used. In response to the negative shocks confronting the economy in 1985–86, 1997–98 and 2008–09, a major programme of wage subsidies—taking the form of a major cut in employers' CPF contribution rates in the first two episodes and a jobs credit funded by the government in the third episode—accompanied some adjustment of the exchange rate. In this Special Feature, we have examined the theoretical channels through which a wage subsidy scheme works to fight a recession. We also took a preliminary look at some data based on the Singapore experience. A more formal modelling of how the wage subsidy scheme works along with an exchange rate-based policy rule remains an item for future research.

References

Alchian, A A, Archibald, G C and Phelps, E S (1970), *Microeconomic Foundations of Employment and Inflation Theory*, W. W. Norton & Company.

Department of Statistics, Singapore (2014), *Yearbook of Statistics Singapore, 2014*.

Hoon, H T and Phelps, E S (1992), "Macroeconomic Shocks in a Dynamized Model of the Natural Rate of Unemployment", *American Economic Review*, Vol. 82(4), pp. 889–900.

Hoon, H T and Phelps, E S (2003), "Low-Wage Employment Subsidies in a Labor-Turnover Model of the 'Natural Rate'", pp. 16–43, in Phelps, E S (eds.), *Designing Inclusion: Tools to Raise Low-end Pay and Employment in Private Enterprise*, Cambridge University Press.

Hoon, H T and Phelps, E S (2008), "Future Fiscal and Budgetary Shocks", *Journal of Economic Theory*, Vol. 143(1), pp. 499–518.

Klenow, P J and Malin, B A (2011), "Microeconomic Evidence on Price-setting", pp. 231–284, in Friedman, B M and Woodford, M (eds.), *Handbook of Monetary Economics*, Elsevier.

Mihov, I (2013), "The Exchange Rate as an Instrument of Monetary Policy", *Macroeconomic Review,* Vol. XII(1), pp. 74–82.

Ministry of Trade and Industry, Singapore (1998), *Committee on Singapore's Competitiveness Report*.

Phelps, E S and Winter, S G (1970), "Optimal Price Policy under Atomistic Competition", pp. 309–337, in Alchian, A A, Archibald, G C and Phelps, E S (eds.), *Microeconomic Foundations of Employment and Inflation Theory*, W. W. Norton & Company.

Taylor, J B (1999), "Staggered Price and Wage Setting in Macroeconomics," pp. 1009–1050, in Taylor, J B and Woodford, M (eds.), *Handbook of Macroeconomics*, Elsevier.