

### Box 1.2: Trends in Singapore's Unit Labour Cost During Recessions

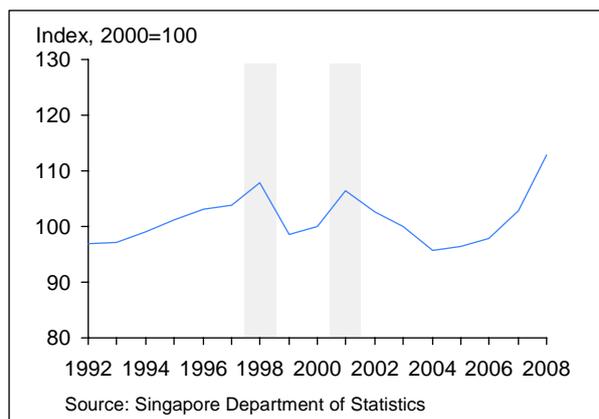
#### Aim

This box presents recent trends in unit labour cost<sup>1</sup> (ULC) for the overall economy and the manufacturing sector, and compares them with the trends during past recessions. It also examines the drivers of ULC growth over the period 1992-2008 by decomposing it into the contribution of (the inverse of) productivity growth and increases in labour cost per worker.

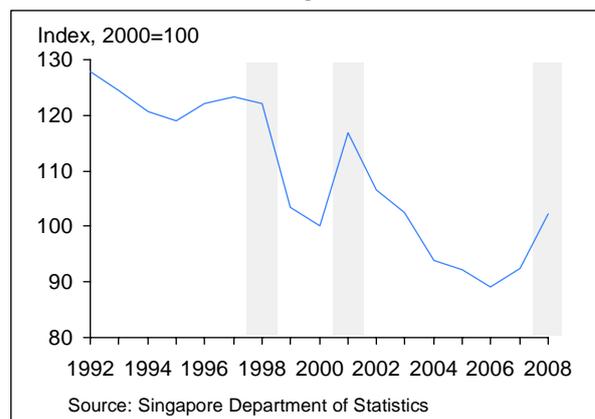
#### Background

In 2008, overall ULC increased by 9.6 per cent, a sharp rise from the 5.2 per cent and 1.3 per cent recorded in 2007 and 2006 respectively. Similarly, the manufacturing ULC rose by 11 per cent in 2008, a marked increase from the 3.9 per cent and -3.6 per cent in the previous two years ([Exhibits 1A](#) and [1B](#)). The ULC has continued its upward trend in 2009. Latest data shows that overall ULC rose by 9.2 per cent and manufacturing ULC by 30.0 per cent in the first quarter of 2009.

**Exhibit 1A Overall ULC, 1992-2008**



**Exhibit 1B Manufacturing ULC, 1992-2008**



**Note:** Shaded areas in [Exhibits 1A](#) and [1B](#) represent years of negative overall GDP growth and negative manufacturing value-added growth respectively.

The sharp increase in ULC in 2008 and in the first quarter of 2009 is consistent with the experience during past recessions in 1998 and 2001. During those periods, ULC also spiked, by 4.0 per cent and 6.4 per cent respectively, and came down only in the year after the recessions.

As the ULC is defined as total labour cost<sup>2</sup> relative to output, it is not just a measure of labour cost but also provides some notion of efficiency or productivity. To determine the extent to which ULC has been driven by productivity or labour cost changes over the years, we decompose ULC growth into its component factors for both the overall economy and the manufacturing sector.

<sup>1</sup> The unit labour cost (ULC) is defined as the total labour cost per unit of real output.

<sup>2</sup> Total labour cost comprises wages and salaries, benefits, CPF contributions by employers, foreign workers' levy and skill development levy.

**Methodology**

The ULC is defined as total labour cost (TLC) per unit of output, and can be decomposed into TLC per worker and the inverse of productivity as follows:

$$\text{ULC} = \text{Total Labour Cost} / \text{Real Value-Added} \quad [\text{Equation 1}]$$

$$\text{ULC} = \underbrace{(\text{Total Labour Cost} / \text{Worker})}_{\text{Total Labour Cost per worker}} * \underbrace{(\text{Workers} / \text{Real Value-Added})}_{\text{Inverse of Productivity}} \quad [\text{Equation 1'}]$$

From Equation 1', the growth in ULC can be approximated as the sum of the growth in TLC per worker and the growth in the inverse of productivity:

$$\% \Delta \text{ULC} = \underbrace{\% \Delta (\text{TLC} / \text{Worker})}_{\text{Growth in TLC per worker}} + \underbrace{\% \Delta (\text{Workers} / \text{Real Value-Added})}_{\text{Growth in Inverse of Productivity}} \quad [\text{Equation 2}]$$

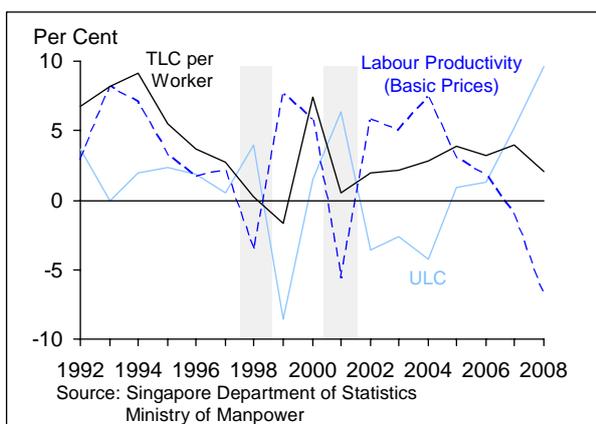
In other words, increases in ULC are driven by an increase in the TLC per worker or a decline in productivity (which is equivalent to an increase in the inverse of productivity). On the other hand, declines in ULC are driven by a fall in TLC per worker or an increase in productivity.

**Decomposition Results**

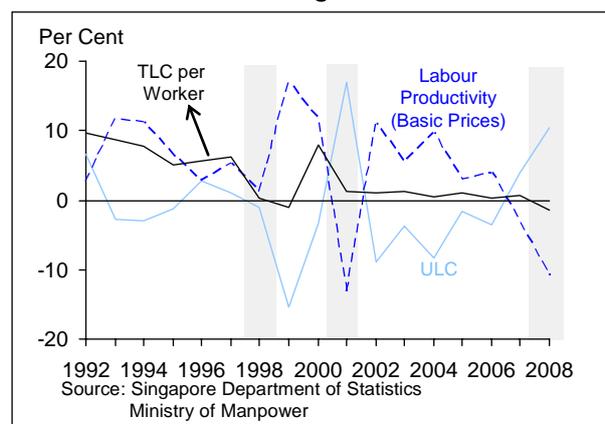
**Annual Data**

The results of the decomposition exercise are presented graphically in Exhibits 2A and 2B. They show clearly the strong inverse relationship between ULC growth and labour productivity growth for both the overall economy and the manufacturing sector. However, the impact of TLC per worker on ULC growth is less obvious, suggesting that it is less important than productivity as a driver of changes in the ULC. In particular, it can be observed that the rise in overall ULC during the 1998 and 2001 recessions as well as the downturn in 2008 was driven by the pro-cyclical decline in productivity, rather than labour cost increases.

**Exhibit 2A: Overall ULC, 1992-2008**



**Exhibit 2B: Manufacturing ULC, 1992-2008**



**Note:** Shaded areas in Exhibits 2A and 2B represent years of negative overall GDP growth and negative manufacturing value-added growth respectively.

**Exhibits 3A and 3B** show the percentage point contributions of productivity and labour cost per worker to overall ULC and manufacturing ULC growth respectively. For overall ULC, productivity changes accounted for 55 per cent of the total impact of TLC per worker and workers per unit of output (i.e., the inverse of productivity) on ULC over the entire period of 1992-2008. Within the period, we highlight the ULC trends in three phases of the business cycle:

- a) **Recessionary and downturn years (i.e., 1998, 2001 and 2008).** ULC tended to rise sharply during these periods. Around 80-95 per cent of the rise in ULC during these recessions was driven by the decline in productivity. Labour productivity is typically pro-cyclical (i.e., falls during downturns).<sup>3</sup> One explanation given in the academic literature is that firms may hoard labour during downturns.<sup>4</sup> Due to adjustment costs, some firms may find it optimal to hoard "excess labour" if they expect the downturn to be relatively short, so that they would be able to ramp up production quickly when the economy recovers.<sup>5</sup> On the other hand, the contribution of TLC per worker to ULC growth was small as labour costs tended to moderate downwards, albeit slowly, during downturns.
- b) **Recovery years (i.e., 1999-2000 and 2002-2004).** The ULC tended to fall during these recovery periods, with labour productivity improvements accounting for 60-70 per cent of the total impact on ULC. Firms could ramp up output quickly by using existing labour more intensively, especially given hiring lags. However, as the labour market tightened, growth in TLC per worker partially offset the impact of the rise in labour productivity.
- c) **Periods of sustained strong GDP growth (i.e., 1992-1997 and 2005-2007).** With sustained growth after the initial recovery periods, ULC tended to rise again due to strong increases in TLC per worker arising from a tight labour market. In contrast to the recovery years, the rise in TLC per worker was large enough to outstrip the impact of continued productivity improvements

**Exhibit 3A: Decomposition of Overall ULC Growth, 1992-2008**

Average Growth	Per Cent			
	ULC (a) = (b)+(c)	TLC / Worker (b)	Workers / VA <sup>(1)</sup> (c)	Contribution of Productivity <sup>(2)</sup> $ c  / ( b  +  c )$ <sup>(3)</sup>
1992-2008	1.2	3.7	-2.4	55
1992-1997	1.7	6.0	-4.0	38
1998	4.0	0.2	3.7	95
1999-2000	-3.6	2.9	-6.3	62
2001	6.4	0.5	5.9	92
2002-2004	-3.5	2.3	-5.7	71
2005-2007	2.5	3.7	-1.2	34
2008	9.6	2.1	7.4	78

**Notes:**

1) Calculated based on Gross Value Added (VA) at 2000 basic prices. As Workers / VA is the inverse of productivity, a negative (positive) rate of growth in Workers / VA implies a rise (decline) in productivity.

2) The average contribution of productivity to the ULC changes for the different periods is computed as the average of the productivity contributions for the individual years within the period.

3)  $|x|$  = absolute value of x

<sup>3</sup> The pro-cyclical behaviour of labour productivity has achieved the status of a stylised fact of macroeconomics. It has been confirmed by studies at levels of aggregation ranging from the firm to the national economy, and for a variety of countries and sample periods. See, Bernanke and Parkinson (1991).

<sup>4</sup> This explanation is favoured by Keynesians. Other explanations include pro-cyclical technological shocks favoured by real business cycle theorists; and increasing returns to scale.

<sup>5</sup> See for example DeLong, J. Bradford and Waldmann, Robert J. (1997).

For the manufacturing sector, the contribution of productivity changes to the total impact of TLC per worker and workers per unit of output on its ULC over the period 1992-2008 was larger, at 70 per cent ([Exhibit 3B](#)). The trends in manufacturing ULC over the business cycle are similar to those observed for the trends for overall ULC explained above. However, there were two key differences:

- a) **1998 recession.** Unlike in the case of the overall ULC, manufacturing ULC fell during the 1998 recession. The 1998 recession came on the back of two previous years of slow growth in the manufacturing sector due to a global semiconductor slowdown. With sentiments already weak, the onset of the Asian Financial Crisis led to record high retrenchments (18,900) in the manufacturing sector in 1998. This large adjustment in labour caused manufacturing productivity growth to remain positive in 1998, despite negative output growth. Productivity growth in turn helped to lower the manufacturing ULC.
- b) **Post-2001 recession.** Unlike in the case of overall ULC, manufacturing ULC continued to fall throughout the period after the 2001 recession up to the 2008 downturn, although the pace of decline slowed in the second half of the period. Much of the fall was due to productivity improvements as manufacturing output growth outstripped employment growth, while the impact due to the increase in TLC per worker remained muted. With strong output and employment growth in the run-up to the 2008 downturn, the subsequent collapse in output and labour adjustment lags caused productivity to plunge in 2008. This decline far outpaced the reduction in TLC per worker, thus resulting in a sharp rise in manufacturing ULC in 2008.

**Exhibit 3B: Decomposition of Manufacturing ULC Growth, 1992-2008**

Average Growth	Per Cent			
	ULC (a) = (b)+(c)	TLC / Worker (b)	Workers / VA <sup>(1)</sup> (c)	Contribution of Productivity <sup>(2)</sup> $ c  / ( b  +  c )$ <sup>(3)</sup>
1992-2008	-0.7	3.2	-3.7	70
1992-1997	0.6	7.2	-6.2	44
1998	-1.0	0.2	-1.2	83
1999-2000	-9.3	3.4	-12.4	75
2001	17.0	1.4	15.6	93
2002-2004	-7.0	1.0	-7.9	88
2005-2007	-0.5	0.7	-1.1	83
2008	10.5	-1.5	12.2	89

Notes:

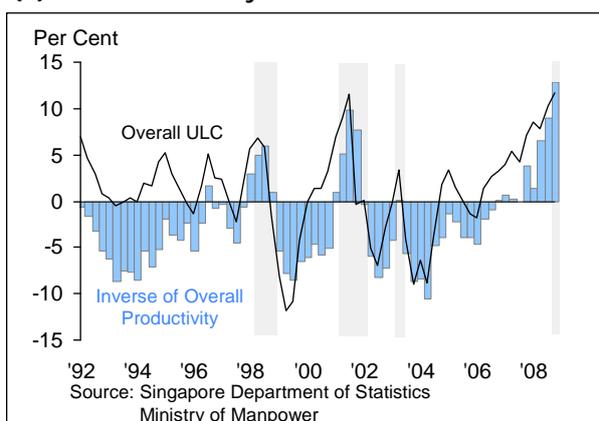
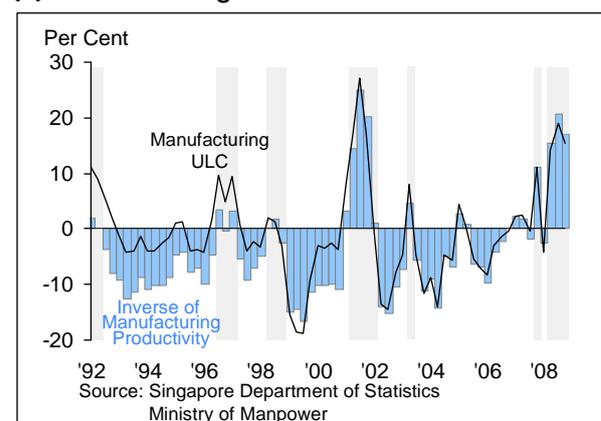
1) Calculated based on Gross Value Added (VA) at 2000 basic prices. As Workers / VA is the inverse of productivity. Hence, a negative (positive) rate of growth in Workers / VA implies a rise (decline) in productivity.

2) The average contribution of productivity to the ULC changes for the different periods is computed as the average of the productivity contributions for the individual years within the period.

3)  $|x|$  = absolute value of x

### Quarterly Data

Quarterly analysis of ULC trends reinforces the conclusions from the annual analysis. [Exhibits 4A](#) and [4B](#) show the percentage point contributions of productivity changes to changes in the overall and manufacturing ULCs.

**Exhibit 4: Growth of ULC and Contribution of Productivity, 1Q 1992-4Q 2008****(A) Overall Economy****(B) Manufacturing****Notes:**

- 1) Shaded areas in Exhibits 4A and 4B represent quarters of negative overall GDP growth and negative manufacturing value-added growth respectively.
- 2) The blue bars show the percentage point contributions of changes in the inverse of labour productivity to the respective ULC changes. A negative contribution implies positive labour productivity growth, while a positive contribution implies negative labour productivity growth. Changes in ULC that are not attributed to labour productivity changes can be attributed to changes in TLC per worker.

It is clear from the charts that **productivity changes were the key contributors to the rise in overall and manufacturing ULCs during the downturns, and also their subsequent declines during recovery periods.** During the period of sustained strong growth in the early to mid-1990s, overall ULC rose on the back of increases in TLC per worker. While the annual data had suggested that this was also true in the subsequent growth period of 2005-2007, analysis of the quarterly data has shown that the rise in overall ULC was increasingly driven by the fall in productivity rather than increases in TLC per worker. Compared to the overall ULC, TLC per worker was relatively less important as a driver of the manufacturing ULC even during periods of strong sustained growth.

**Conclusion**

The analyses above suggest that ULC is heavily influenced by productivity changes, especially during downturns and recovery years. Given the pro-cyclical nature of productivity, ULC has a tendency to rise during downturns, including the current one. This is especially so since the downward adjustment of labour cost per worker (e.g., wages) takes time, and is not likely to offset the impact of the fall in productivity. However, in periods of strong sustained growth, labour costs become a more important driver of ULC increases for the overall economy.

Recent labour market initiatives such as the Skills Programme for Upgrading and Resilience (SPUR) and the Jobs Credit Scheme (JCS) will help to keep local workers employed during the current downturn. These schemes are therefore likely to contribute to further declines in productivity, since output is unlikely to grow strongly. On the other hand, the JCS, which is akin to a wage subsidy for local workers, may also help firms to lower their labour costs per worker. While the net effect of the new schemes on the ULC is unclear at this juncture, past experience suggests that the productivity effect may dominate. This implies that the ULC will continue to rise, at least in the first half of 2009.

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