

information paper  
on  
economic statistics

**METHODOLOGICAL REVIEW ON THE  
UNIT BUSINESS COST INDEX FOR  
MANUFACTURING INDUSTRY  
(BASE YEAR 2010 = 100)**

Singapore Department of Statistics  
November 2014

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# METHODOLOGICAL REVIEW ON THE UNIT BUSINESS COST INDEX FOR MANUFACTURING INDUSTRY (BASE YEAR 2010 = 100)

## I. INTRODUCTION

1. The Singapore Department of Statistics (DOS) has recently completed the methodological review of the quarterly Unit Business Cost Index (UBCI) for the manufacturing industry. These improvements ensure the continued relevance of the UBCI in monitoring business cost in the manufacturing industry. In line with the recent rebasing of the national accounts to reference year 2010, the quarterly UBCI data series is re-scaled from base year 2005 to base year 2010.

2. This paper is structured as follows: Section II explains the key methodological improvements to the quarterly UBCI estimates. Section III analyses underlying trends of the 2010-based UBCI. Further details on the underlying concepts and coverage of UBCI are available in the Annex. The revised UBCI series is included in the Appendix.

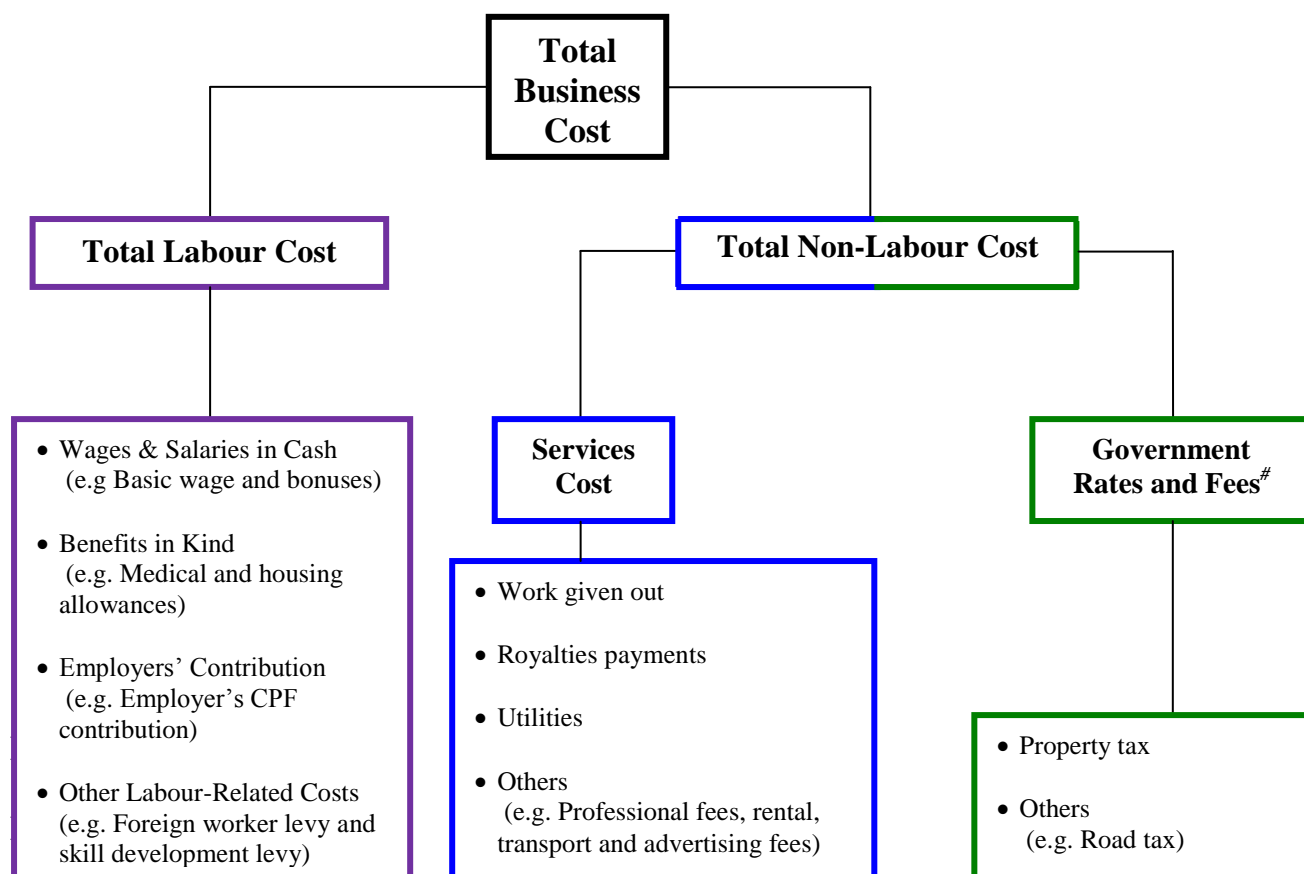
## II. METHODOLOGICAL IMPROVEMENTS

3. The UBCI for manufacturing measures the relative business cost of producing one unit of real manufacturing output. The main components of business cost are labour cost, services cost and government rates and fees. Table 1 below summarizes the methodological improvements to the UBCI, which focuses on the non-labour cost component (i.e. services cost and government rates and fees). The underlying methodology and data sources for the labour cost component remain unchanged. An overview of the major components of total business cost is shown in Chart 1.

Table 1: Methodological Improvements to UBCI

S/N	Issue	Previous	Revised
1)	Benchmark Data & Proxy Indicators	Benchmark data are based on 5-yearly Input-Output (IO) tables, extrapolated by relevant quarterly price indicators.	Benchmark data are based on more timely annual data from Census of Manufacturing Activities (CMA), extrapolated by data available from Monthly Survey of Manufacturing Activities (MMA).
2)	Productivity of Inputs	Previous methodology accounts for the changes in productivity of labour inputs.	Revised methodology accounts for changes in productivity of both labour and non-labour inputs.  Refer to Annex for details.

Chart 1: An Overview of the Major Components of Business Cost in UBCI



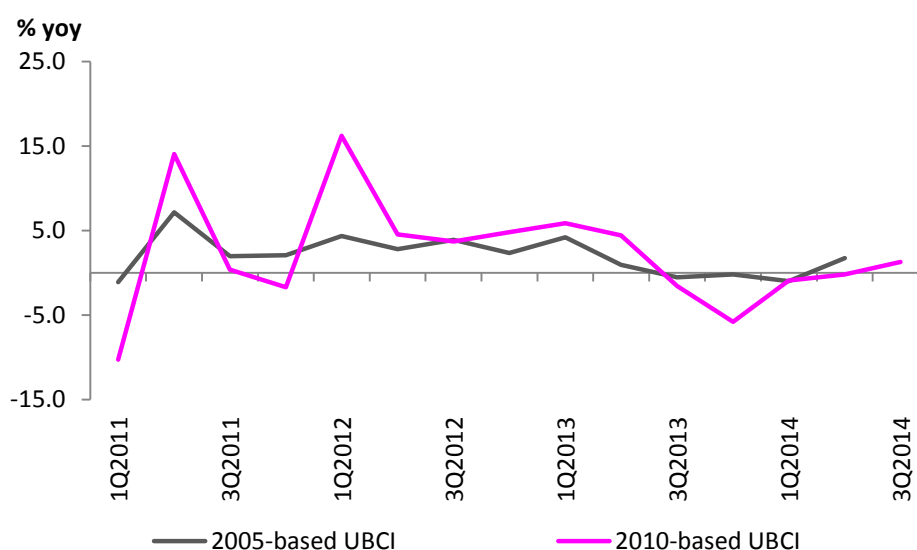
# Government rates and fees refer to non-labour related taxes on production. Labour-related taxes on production (e.g. foreign workers levy) are classified under labour cost. Taxes on income (e.g. corporate income tax) are excluded from government rates and fees in UBCI.

### III. ANALYSIS

#### *Growth of revised 2010-based UBCI more pronounced*

4. The methodological review resulted in a more pronounced growth for the 2010-based UBCI compared to the 2005-based series (Chart 2). This could mainly be attributed to inherent fluctuations underlying the productivity of non-labour inputs and the incorporation of benchmark data from the Census of Manufacturing Activities (CMA).

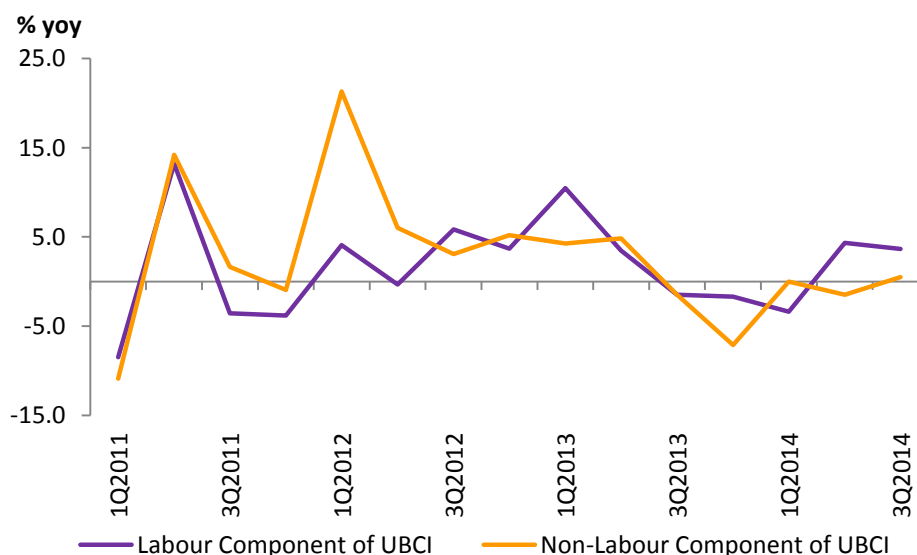
Chart 2: Growth of 2005-based UBCI and 2010-based UBCI, 1Q 2011 – 3Q 2014



*Non-Labour Component More Volatile in UBCI Growth*

5. Chart 3 shows the underlying growth of the labour and non-labour components of UBCI.

Chart 3: Growth of Labour and Non-Labour Components of UBCI, 1Q 2011 – 3Q 2014



6. It is interesting to note that the volatility in the growth of the labour component of UBCI (i.e. unit labour cost) could largely be attributed to fluctuations in real VA (Chart 4). On the other hand, the volatility in the growth of the non-labour component of UBCI (i.e. unit non-labour cost) is contributed by both fluctuations in growth of real VA and total non-labour cost (Chart 5).

Chart 4: Growth of Total Labour Cost and Real VA,  
1Q 2011 – 3Q 2014

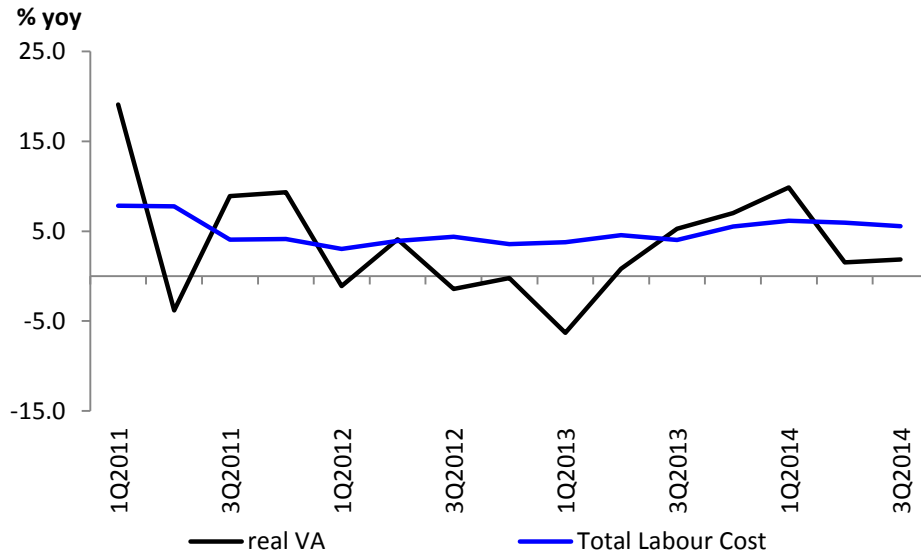
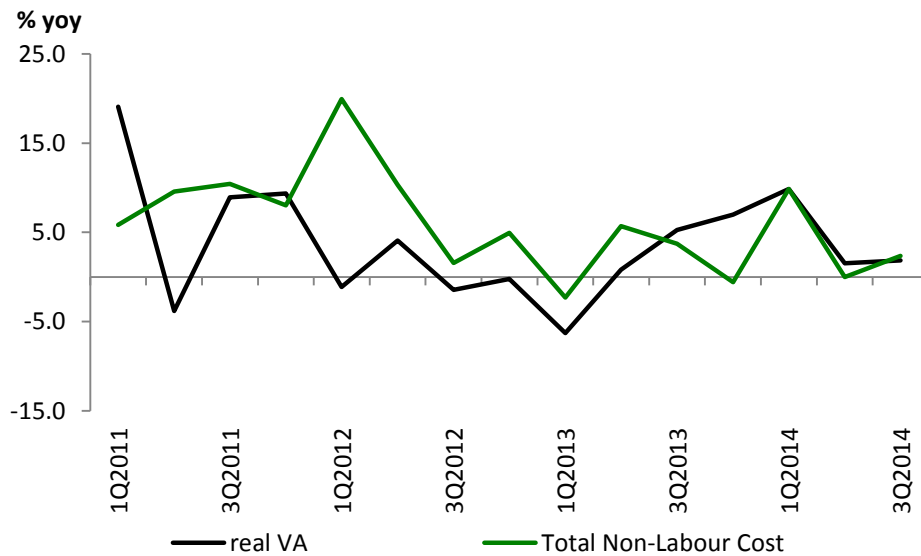


Chart 5: Growth of Total Non-Labour Cost and Real VA,  
1Q 2011 – 3Q 2014



*Stable Share of Labour Cost in Total Business Cost*

7. Table 2 shows the composition of total business cost from 2010 to 2013. The share of labour cost has remained fairly stable, contributing to about a quarter of total business cost in manufacturing. Non-labour cost contributed to the remaining three-quarter of total business cost with royalties payments (21 per cent), work given out (18 per cent) and utilities cost (10 per cent) forming the bulk of services costs in 2013.

Table 2: Share of Components of Business Cost in UBCI,  
2010 – 2013

								Per Cent
	Total	Labour cost	Services cost					Government rates & fees
			Total	Work given out	Royalties	Utilities	Others	
<b>2010</b>	<b>100.0</b>	<b>25.8</b>	<b>73.8</b>	20.0	19.3	8.8	25.7	<b>0.4</b>
<b>2011</b>	<b>100.0</b>	<b>25.3</b>	<b>74.1</b>	18.4	20.2	10.3	25.2	<b>0.6</b>
<b>2012</b>	<b>100.0</b>	<b>24.5</b>	<b>75.0</b>	18.0	21.5	10.2	25.3	<b>0.5</b>
<b>2013</b>	<b>100.0</b>	<b>25.0</b>	<b>74.4</b>	17.9	21.3	9.6	25.6	<b>0.6</b>

#### IV. CONCLUSION

8. The successful review of the methodology and data sources of the UBCI from reference year 2010 ensures its continuing relevance for monitoring business cost in the manufacturing industry.

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**(A) Concept of Unit Business Cost Index (UBCI) for Manufacturing**

1. The UBCI measures changes in the relative business cost of producing one unit of real manufacturing output, where business cost comprises both labour and non-labour cost.

2. The Unit Labour Cost (ULC), which measures labour cost per unit of real VA, may be expressed as the average labour cost divided by the productivity of labour inputs by introducing employment into equation (1).

$$\begin{aligned}
 \text{Unit Labour Cost (ULC)} &= \frac{\text{Total Labour Cost (TLC)}}{\text{Real Value Added (VA)}} \\
 &= \frac{\text{Total Labour Cost (TLC) / Total Employment}}{\text{Real Value Added (VA) / Total Employment}} \\
 &= \frac{\text{Average Labour Cost}}{\text{Productivity of Labour Inputs}} \quad (1)
 \end{aligned}$$

3. Extending the similar concept from ULC, UBC takes into account both changes in productivity of labour and non-labour inputs as shown in equation (2).

$$\begin{aligned}
 \text{Unit Business Cost (UBC)} &= \frac{\text{Total Business Cost (TBC)}}{\text{Real Value Added (VA)}} \\
 &= \frac{\text{Total Labour Cost (TLC)}}{\text{Real Value Added (VA)}} + \frac{\text{Total Non – Labour Cost (TNLC)}}{\text{Real Value Added (VA)}} \\
 &= \frac{\text{Average Labour Cost}}{\text{Productivity of Labour Inputs}} + \frac{\text{Average Non – Labour Cost}}{\text{Productivity of Non – Labour Inputs}} \quad (2)
 \end{aligned}$$

4. The UBC can be subsequently expressed as an index by dividing it over its value at the base year ( $UBC_0$ ) (i.e. 2010=100) as shown in equation (3).

$$\text{Unit Business Cost Index (UBCI)} = \frac{\text{Unit Business Cost (UBC)}}{\text{Unit Business Cost at base year (} UBC_0 \text{)}} \times 100 \quad (3)$$

5. To ensure a continuous time series, historical series of the 2005-based UBCI prior to 2010 are re-scaled using the following formula as shown in equation (4).

$$UBCI_{2010} = UBCI_{2005} \times \frac{\text{annual UBCI}_{2010 \text{ in } 2010}}{\text{annual UBCI}_{2005 \text{ in } 2010}} \quad (4)$$

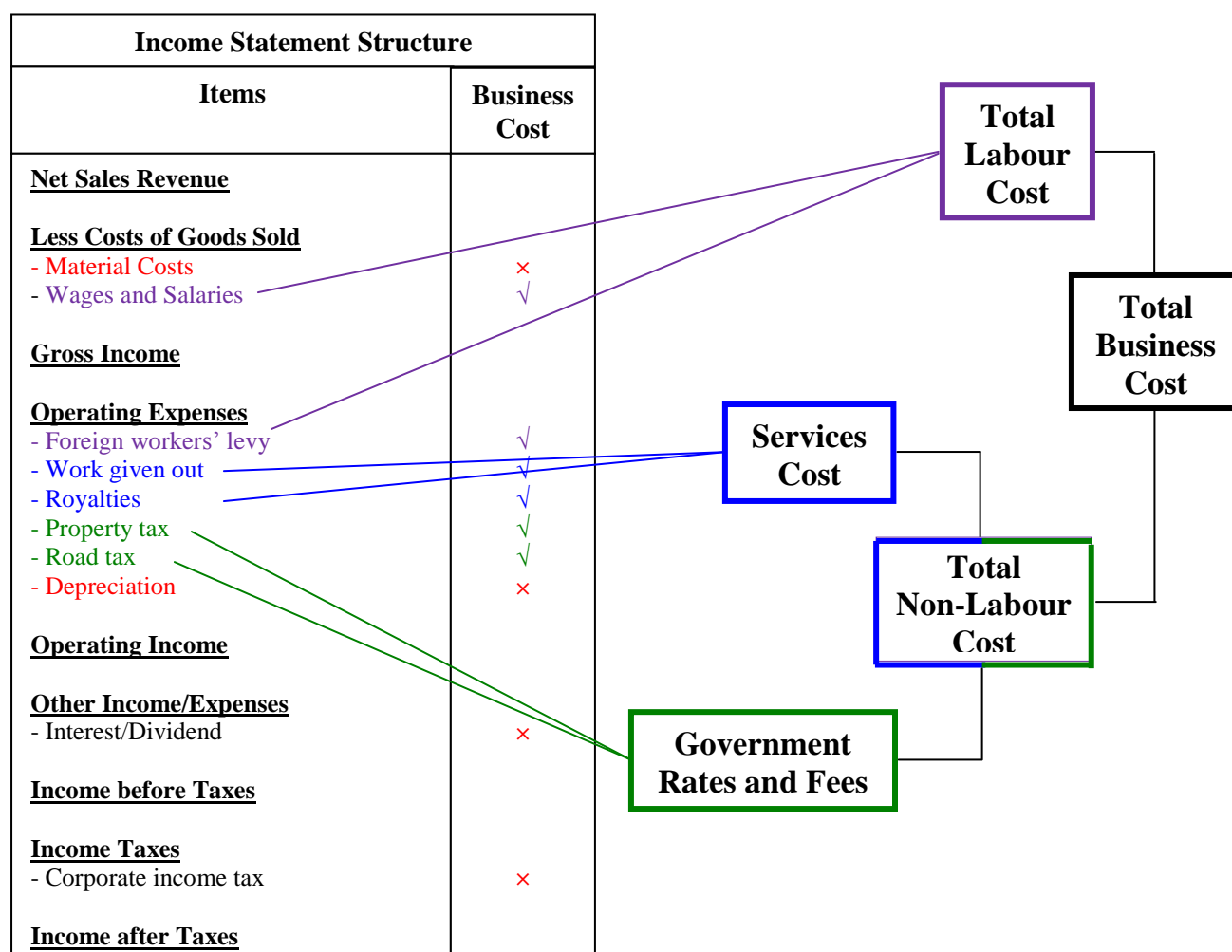


## (B) Coverage of Unit Business Cost Index (UBCI) for Manufacturing

1. Total business cost comprises labour cost and non-labour cost (i.e. services cost and government rates and fees). In general, operating expenses (except material costs<sup>1</sup> and depreciation<sup>2</sup>) are included in total business cost of the UBCI. Non-operating expenses (e.g. corporate income tax, capital expenditure and interest/dividends) are excluded.

2. As an illustration, Chart A.1 shows selected expenses from profit & loss income statement which are classified as business cost in UBCI for manufacturing.

Chart A.1: Selected Expenditure Items Included in Total Business Cost



<sup>1</sup> As raw materials are largely imported, material cost such as the commodity prices of raw materials apply not only to Singapore but also to other countries. Hence, material cost is excluded from the computation of the UBCI.

<sup>2</sup> Depreciation is not considered as a business cost in UBCI because it is largely a non-monetary expense. While depreciation is recorded as an expense in the profit & loss income statement, no explicit cost was incurred during the period.

**Table A.1 Unit Business Cost Index for Manufacturing,  
1Q 2010 – 3Q 2014**

		Index (2010 = 100)			
		Overall	Unit Labour Cost	Services Cost	Government Rates & Fees
<b>2010</b>	<b>1Q</b>	102.5	115.5	97.7	141.9
	<b>2Q</b>	86.7	78.9	89.5	80.5
	<b>3Q</b>	98.6	92.4	100.9	73.6
	<b>4Q</b>	112.2	113.1	111.9	104.0
<b>2011</b>	<b>1Q</b>	92.0	105.7	86.8	177.9
	<b>2Q</b>	98.9	89.3	101.9	145.5
	<b>3Q</b>	99.0	89.1	102.2	143.6
	<b>4Q</b>	110.3	108.8	110.4	167.3
<b>2012</b>	<b>1Q</b>	106.9	110.0	105.4	187.2
	<b>2Q</b>	103.4	89.0	108.2	127.4
	<b>3Q</b>	102.7	94.3	105.5	125.4
	<b>4Q</b>	115.6	112.8	116.4	142.2
<b>2013</b>	<b>1Q</b>	113.2	121.5	109.8	217.8
	<b>2Q</b>	108.0	92.1	113.4	135.4
	<b>3Q</b>	101.1	92.9	103.8	134.4
	<b>4Q</b>	108.9	110.9	108.0	147.7
<b>2014</b>	<b>1Q</b>	112.2	117.4	109.8	207.4
	<b>2Q</b>	107.8	96.1	111.7	140.0
	<b>3Q</b>	102.4	96.3	104.3	140.7

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