OECD Labour Productivity and Unit Labour Cost Indicators

A. Introduction

OECD analysts now have the choice of three OECD databases that publish Labour Productivity (LP) measures and two OECD databases that publish Unit Labour Cost (ULC) indicators. This short paper has been prepared in the interests of avoiding confusion and to help the user understand the differences between these three databases:

- OECD Productivity Database (PD);
- OECD STAN Industrial Database for Structural Analysis (STAN); and,
- OECD System of Unit Labour Cost and Related Indicators (ULCRI).

The objective of this paper is threefold, to give an overview of each database, to explain why differences exist across data sets, and to provide direct web-links to the databases and related methodological information (metadata).

The three databases have been designed for different purposes:

- The Productivity Database is concerned with providing the best possible internationally comparable annual estimates of labour productivity and multi-factor productivity (MFP) at the Total Economy level and providing underlying data for capital services by asset type.
- The STAN database attempts to provide the best possible estimates of annual measures for analysing industrial performance at a relatively detailed level of activity. Designed for modelling purposes, it can be used to derive estimates of labour productivity that, while not as comparable as those in Productivity Database, provide insights into industry contributions to total productivity.
- The new System of Unit Labour Cost and Related Indicators database, which is updated at the end of each quarter, consist of long time series of annual and quarterly *Unit Labour Cost* and related indicators compiled using a specific methodology to maximise comparability across countries. The related indicators include annual time series for: *Exchange Rate Adjusted Unit Labour Costs*; *Labour Income Share* ratios; *Labour Productivity* levels and indices and; *Labour Compensation* per unit labour input levels and indices. Data are available for all OECD member countries and the Euro area for a wide range of sectors including Total Economy, Manufacturing & Industry, Market Services and the Business Sector.

A1. OECD Productivity Database

The OECD Productivity Database is a joint exercise involving four OECD Directorates: Statistics Directorate (STD), Directorate for Science, Technology and Industry (STI), Directorate for Employment, Labour and Social Affairs (ELS) and Economics Department (ECO). This database provides annual series of labour productivity growth and levels for the whole economy covering OECD countries as well as a range of economic / geographical zones. It also includes annual estimates for capital services and multi-factor productivity for twenty OECD countries at the total economy level. This product is updated on a rolling-basis.

Labour productivity is defined as Gross Domestic Product per hour. For each country, GDP refers to Gross Domestic Product in volume terms (real GDP), in national currency, while for economic / geographical zones, it refers to real GDP in US dollars, constant PPPs.

Labour input is defined as total hours worked by all persons engaged (salaried employees plus self-employed and family members). Comparable measures of labour input are of great importance for international comparison of productivity growths and levels. For each country, labour input is calculated as average hours worked multiplied by the appropriate measure of employment. Generally, the default source for total hours worked in the productivity database is the OECD annual *System of National Accounts* database (SNA). However, for a number of countries, the national accounts do not provide hours worked and other sources have to be invoked. Consistency of data is achieved by matching the hours worked that are collected by the OECD for its annual *OECD Employment Outlook* (EMO) with the conceptually appropriate measure of employment for each individual country, *i.e.* the measure of employment for that country that is consistent with the measure of hours worked collected by the OECD.

In the OECD Productivity Database, measures of labour productivity growths are presented as indices (year 2000=100) and rates of change, while levels are presented relative to the US.

A2. OECD STAN Industrial Database for Structural Analysis

The OECD STAN database provides analysts and researchers with a comprehensive tool for analysing industrial performance at a relatively detailed level of activity. This database includes annual measures of output, labour input, investment and international trade. Time-series are presented for all OECD countries with the exception of Turkey and while the last published version (in November 2005) presented data for 1970-2003, the forthcoming new version will present data for 1970-2006. STAN allows users to construct a wide range of indicators and to focus on areas such as productivity growth, competitiveness and general structural change.

Through the use of a standard industry list, comparisons can be made across countries. The STAN industry list is based on the ISIC Rev. 3 classification and covers all activities, including services; it also provides sufficient detail to enable users to highlight high-technology sectors and is compatible with those used in other STI related databases, such as the OECD Input-Output Harmonised Tables and the OECD STAN Bilateral Trade Database.

STAN is primarily based on member countries' Annual National Accounts by activity tables and uses data from other sources, such as national business surveys/censuses, to estimate any missing details. In STAN, since many of the data points are estimated, they do not represent official member countries' submissions. The last version of STAN database was released at the end of 2005 (data to 2003). Since then, the growing complexity of STAN and related data sets, such as Bilateral Trade by industry (BTD) and harmonised Input-Output Tables (I-O), and increasing demand for user support functions has greatly exceeded expectations. This has caused the update originally scheduled in spring 2006 to be delayed to spring 2008.

A3. OECD System of Unit Labour Cost and Related Indicators database

This new System was developed by the OECD in response to concerns from the international community of economic analysts on the limited availability of internationally comparable data concerning labour costs, particularly in activities outside of Manufacturing and on a sub-annual basis. The release of this product represented the outcome of four years of development work by the OECD benefiting from contributions by academia and national consultants, and involved extensive consultation with national statistics offices, national central banks, and the OECD Economics Department.

The *OECD System of Unit Labour Cost and Related Indicators* compiles annual and quarterly ULC and related indicators according to a specific methodology to ensure data are comparable across countries. This system is principally based on national accounts concepts and data, but also brings together a wide range of

national sources for quarterly data. The compilation of the quarterly ULC indicators involves the following stepwise process:

- Identifying suitable quarterly indicator data. The target variable for total labour costs is compensation of employees and proxy variables in order of preference include: gross wages and salaries; labour cost index multiplied by hours worked; earnings or wage series multiplied by total employment. The target variable for real output is constant price value added with production indices being used as proxies if required and available.
- Benchmarking to more reliable annual data to form a consistent set of temporally disaggregated quarterly time series of total labour costs and real output.
- Taking the quotient of the above input series as the raw ULC series and deriving both seasonally adjusted and trend-cycle series, the latter being a combination of a long-term trend and business cycle series, produced using the TRAMO-SEATS software.

The related indicators include annual time series for: labour productivity; labour compensation per unit labour input (including PPP adjusted); exchange rate adjusted unit labour costs and; labour income share ratios. Data are available for all OECD member countries, selected geographical zones for eight economic activities[1].

B. General Database Differences

Virtually all differences between these three databases can be grouped into three categories:

- Data vintage;
- Input series and adjustments; and,
- Series sources.

B1. Series vintages

As all three databases have different updating policies the problem of which country series vintage is being used will cause differences. It is known that a country's National Accounts data can be heavily revised due to a host of reasons (recent examples include the move to the use of annually reweighed chained Laspeyres methodology for deriving volume series, and the introduction of FISIM adjustment by economic activity). It is also known that countries tend to release their national account tables at different times depending on the level of detail being published and the account being published.

For example, a number of OECD countries will publish Gross Domestic Product (Expenditure approach) for the A6 (ISIC: Total Economy, AB, C_E, F, G_I, JK, and L_P) before they publish GDP by value added or GDP by the income approach or before they publish by the A17 breakdown or the full A31 ISIC breakdown.

So depending on – when the particular OECD database is updated, at what level the data is required for this database, when the country updates their series, and how often the country revises their data – discrepancies are a certainty between the three OECD databases.

[1] Total Economy; Manufacturing (ISIC D); Industry (ISIC C_E); Construction (ISIC F); Trade, Transport and Communication (ISIC G_I); Finance and Business Services (ISIC J_K); Market services (ISIC activity based proxy G_K); Business Sector excluding Agriculture (ISIC activity based proxy C_K).

B2. Input series and adjustments.

Labour productivity and unit labour costs can be calculated using a number of inputs and while there is some overlap between the three databases, there are also differences.

Output: The OECD Productivity Database uses GDP by the expenditure approach whereas the other two databases use total value added from the production approach, value added is the value of output less the value of intermediate consumption; and can be seen as GDP by the expenditure approach minus the net of taxes less subsidies.

Employment: The OECD Productivity Database uses total hours worked for total employment (average hours worked multiplied by total employment all persons), the database also makes adjustments to some country's data so to enable international comparisons. The STAN database uses total employment all persons due to a general absence of hours worked data at sufficient level of industry. The System of Unit Labour Cost and Related Indicators database uses either total hours (for the 16[2] countries available in the OECD Annual National Accounts database) or total employment all persons (for the remaining countries).

Labour Compensation: The STAN database and the OECD System of Unit Labour Cost and Related Indicators database use compensation of employees data. However, the ULCRI database adjusts their measure to account for the self-employed *i.e.* to have estimates of labour compensation for total engaged.

In all three databases there are exceptions to their target definitions further exacerbating any differences already in the databases.

B3. Series sources

While there are overlaps in where all three databases source their data, there are also reasonable differences.

The System of Unit Labour Cost and Related Indicators: This database sources *all* of its annual data from the OECD *System of National Accounts* (SNA) database, maintained by the National Accounts and Financial Statistics (NAFS) division of the OECD's Statistics Directorate. This database receives all national accounts data directly from countries via questionnaires. The country's national accounts data is thoroughly edited and checked before being accepted into the database.

STAN: This database uses SNA as primary source and also sources the required annual data directly from member countries.

Productivity Database: This database uses SNA as its primary data source for labour productivity measures, however where the required data is not available in SNA the following sources are used: OECD Employment Outlook, OECD Labour Force Statistics, OECD Quarterly National Accounts, and national sources.

C. Specific database differences

Due to the general differences outlined, providing the user with a detailed table for each country by variable has limited value as the analysis would almost immediately become outdated due to the database

[2] Australia, Austria, Canada, Denmark, France, Germany, Greece, Hungary, Italy, Korea, Netherlands, Norway, Slovak Republic, Spain, Sweden and Switzerland.

updating and country revision issues. There is also the added issue that the last update of the STAN database was in 2005 with time series availability to 2003.

C1. Labour productivity

All three databases produce measures of labour productivity indicators but there is only one overlapping economic activity for all three databases, namely Total Economy. The differences between the databases, described in the table 1 at the end of this document, are relativity straight forward.

1. For the output variable the OECD Productivity Database uses GDP by expenditure whereas the other two use GDP value added at basic prices.

2. The STAN database uses a combination of SNA and national sources, the OECD System of Unit Labour Cost and Related Indicators database uses the OECD's SNA database, and the OECD Productivity Database uses a combination of SNA and other sources.

3. The biggest cause of any discrepancies between these databases comes from the labour input measure. OECD STAN uses total employment all persons as does the OECD System of Unit Labour Cost and Related Indicators database where hours data is not available in SNA. The OECD Productivity Database uses hours data calculated as average hours worked multiplied by total employment all persons.

The OECD Productivity Database also carries out a number of adjustments to the hours data for some countries, as shown in the table 1.

C2. Unit Labour Costs

ULC indicators are produced by STAN and the OECD System of Unit Labour Cost and Related Indicators for five overlapping activities: Total Economy, Manufacturing, Construction, Market Services, and Business Sector.

Virtually all discrepancies that currently exist between these two databases can be attributed to the series vintage issue outlined early and caused by the OECD STAN database having not being updated since 2005. When STAN commences to be updated again, the different approach to updating as outlined above is also likely to lead to significant differences due to vintages.

Two possible other areas of discrepancies are:

1. Self-employment ratio: The ULCRI database makes an upward adjustment to the compensation of employees data to account for the self-employed. This is simply calculated as Total Employment divided by Employees (using either person or hours depending on availability in the SNA database).

2. Ownership of dwellings: The OECD System of Unit Labour Cost and Related Indicators database makes an adjustment to the activity Financial and Business Services (ISIC JK) to remove the (estimated) component attributed to the services provided by a dwelling to its occupants as this activity has no associated labour input. STAN also makes an adjustment but excludes the entire real-estate services activity (SIC 70).

While these two adjustments will make the ULC indicators produced by the two databases differ, it is virtually impossible to tell to what extent due to the series vintage issue.

Table 1. Productivity and Unit Labour Costs in OECD databases

Total Economy		OECD Productivity Database	OECD STAN	OECD System of Unit Labour Cost and Related Indicators
Definition	*Underlying Definition*	Labour productivity based on gross GDP, expenditure approach and hours	Labour productivity based on value added and persons; unit labour costs based on labour compensation and output	Labour productivity based on value added and either hours or persons; unit labour costs based on labour compensation and output
	Output	Gross domestic product by expenditure approach	Value added (at basic prices)	Value added (at basic prices)
	Labour input	Total hours worked (=average hours worked x total employment)	Total employment (number of all persons engaged)	Total hours worked or total employment (number of all persons engaged)
	Labour Compensation		Compensation of employees	Compensation of employees
Coverage	*Data published*	Levels, growth rates	Indices	Levels, indices, and growth rates
	Updating	Rolling updates	Rolling updates (last updated 2005)	Quarterly
	Time coverage	1970- latest available	1970-2003	1970-latest available
Sources	*Output*	Annual System of National Accounts (SNA) database	Annual System of National Accounts (SNA) database, national sources	Annual and Quarterly System of National Accounts (SNA and QNA) databases, and in some cases other national sources for quarterly data.
	Labour input	SNA, annual labour force statistics (ALFS), Employment Outlook (EMO), national sources	SNA, national sources	SNA
	Labour Compensation		SNA, national sources	SNA
Specific adjustments[3]	*Output for ownership of dwellings*		Yes	Yes
	Compensation for self-employed		No	Yes (total employment divided by employees – using either hours or persons)
	Hours per job vs per person	Persons based annual hours = jobs based annual hours of work x (1 + share of multiple jobholders in total employment)	No	No
Related indicators in the database		Annual capital services, multi-factor productivity, ICT investment – only at total economy level	Annual output, labour input, investment, unit labour costs, labour productivity, and international trade by activity – all at detailed level	Quarterly: Unit labour costs, total labour costs, real output. Annually: Unit labour costs, total labour costs, real output, labour income share ratio, nominal output, total employment to employees ratio, labour compensation per unit labour input, labour productivity per unit labour input, labour compensation per employee – all at eight ISIC activities
Internet sites		www.oecd.org/statistics/productivity/	www.oecd.org/sti/stan/	http://stats.oecd.org/mei/default.asp?rev=3

[3] These only refer to differences between the databases. They do not refer to adjustments done at source, for example the possible adjustments for armed forces, underground economy etc carried out within the update process of the SNA.