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CRECIMIENTO ECONÓMICO Y PRODUCTIVIDAD EN AMÉRICA LATINA

LA KLEMS Productivity Level Database:

Methodology for Estimating Purchasing Power Parities of Output and Inputs and Relative Productivity Levels in Latin America

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(PRELIMINARY VERSION)

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Abstract

The LA KLEMS productivity level database presents a comparison of relative industry productivity levels and competitiveness in Latin America. It presents data on the PPPs (or relative price levels) of output and capital, labour and intermediate inputs at the industry level in Latin America. It also provides data on the relative levels of output, inputs and labour and total factor productivity. In this technical documentation, we first outline the methodology and data sources used for estimating the purchasing power parities (PPPs) of inputs and output at the industry level in Latin America. We then present the methodology for estimating relative levels of output, inputs and labour and total factor productivity that makes use of the estimated PPPs. The estimates of relative productivity levels in Latin America are also presented in this paper. Those estimates should be viewed preliminary and are presented to solicit comments and feedbacks so that the improvement can be made in the future revision to those estimates. The content and coverage of PPPs and LA KLEMS productivity level database are also presented in this paper.

1. INTRODUCTION

The LA KLEMS productivity level database presents a comparison of relative industry productivity levels and competitiveness in Latin America. It includes data on the PPPs (or relative price levels) of output and capital, labour and intermediate inputs at the industry level in Latin America. It also provide data on the relative levels of output, inputs and labour and total factor productivity. In this paper we document methodology and data sources used for estimating the relative prices or PPPs of industrial output, intermediate inputs, value added, and capital and labour input for Latin America and for estimating the relative levels of output, inputs and productivity.

This version of The LA-KLEMS productivity level database presents data at the sector level for eight economies of Latin America (Chile, Colombia, Costa Rica, El Salvador, Honduras, Mexico, Peru and the Dominican Republic) from the period 1990-2018. It complements the growth and productivity accounts component of the LA-KLEMS project that was documented in Hofman et al. (2016) by providing comparative levels of output, inputs and productivity. It provides important information on the difference in the level of labour productivity and output between LA economies and allocates those differences between the difference in input and the difference in the level of technology or total factor productivity (TFP).

The comparison of levels of output, inputs and productivity is based on the volume index of output and inputs. For that purpose, the nominal values of output and inputs are deflated by purchasing power parities (PPPs) to remove the difference in relative prices between economies, where the PPPs reflect price relatives that show the ratio of the prices in national currencies of the good or service output or inputs in different economies. The PPPs must be estimated first before estimating relative levels of productivity.

The construction of LA-KLEMS productivity level database involves two main steps. In the first step, PPPs for gross output, value added, capital, labour and intermediate inputs at the industry level are estimated. In the second step, the estimated PPPs are used to deflate the nominal values of gross output, value added, capital, labour and intermediate inputs at the industry level to derive quantities of output and inputs and to estimate relative total factor productivity level and relative input intensities.

The methodology for estimating PPPs and the relative volume index of output, inputs and productivity levels was developed by Jorgenson and Nishimizu (1978) and Jorgenson, Kuroda, and Nishimizu (1987) which provided a level comparison of output, inputs and productivity between the United States and Japan at both total economy level and industry level. That

methodology is recently adopted and extended for constructing the Groningen Growth and Development Centre (GGDC) Productivity Level database, which provides a level comparison of output, inputs and productivity at a detailed industry level for a set of thirty OECD countries. It is also used for the level comparison of output, inputs and productivity between Canada and the United States and several other studies ((Baldwin, Gu and Yan, 2008, Schreyer 2007).

The rest of the paper is organized as follows. Section 2 presents the methodology for estimating PPPs of gross output, intermediated inputs, and capital and labour input. Section 3 presents the methodology for estimating the relative levels of gross output, intermediate inputs, capital and labour inputs and productivity levels and outlines the level accounting methodology that decomposes the difference in labour productivity into the difference in TFP and the difference in input intensity. Section 4 presents the data sources. Section 5 presents the main estimates from the database. Section 6 presents the content and coverage of the PPPs database and KLEMS productivity level database. Section 7 concludes and highlights main challenges and potential future work for improving the PPP estimates and productivity level database.

2. METHODOLOGY FOR ESTIMATING PPPS OF OUTPUT, INTERMEDIATE INPUTS, CAPITAL AND LABOUR INPUTS

This section presents the methodology for constructing PPPs for gross output, intermediate inputs, capital input and labour inputs. It will also present the methodology for estimating PPPs for value added.

PPPs of gross output reflect the price relatives that show the ratio of the prices in national currencies of the good or service output that is produced in different economies, for example Chile Peso per Mexico Peso. PPPs of intermediate inputs show the ratio of the prices in national currencies of the good or service input that are used in the production in different economies. As industries produce a large number of products and use a large number of goods and services as intermediate inputs, PPPs at detailed product levels are to be aggregated to derive PPPs of gross output and intermediate inputs. The weights for the aggregation are based on the nominal values of various outputs that the industry produce for PPPs of gross output and the nominal values of inputs that the industry use in the production for PPPs of intermediate inputs

Once PPPs for gross output and intermediate inputs are estimated, PPPs for value added is estimated from the identity that value added is the difference between gross output and intermediate inputs and using the double deflation method of gross output and intermediate inputs.

In LA KLEMS database for productivity growth comparison, workers are cross-classified by age, education, and gender to take into account the difference in their marginal productivity, and the measure of labour input take into account the compositional shift of hours worked toward workers with different education levels and experiences (Hofman et al. 2021). The growth in labour input exceeds the growth in hours worked if there is a shift of hours worked towards more educated and more experienced workers.

PPPs for labour input level comparison reflect the ratio of the prices or compensation of labour in domestic currency for each unit of labour input. When there are different types of labour input in production, PPPs for labour input are derived from an aggregation of relative hourly compensation across various types of workers using weights based on their total labour compensation.

Capital input in productivity measurement is the flow of capital services derived using capital assets in a period, and the price of capital input reflects the user cost of using capital assets over a period. The user cost of capital is higher for those assets with shorter service life and higher

depreciation. To take in account those differences, capital input in LAKLEMS is based on the aggregation of capital stock that are grouped into 8 main assets with similar service life and similar depreciation rates using weights that are based on the user cost of capital. For this approach, it is assumed capital service is proportional to capital stock at the detailed asset level. The growth of capital service exceeds the growth of capital stock when there is a shift of capital assets towards assets with shorter service life such as M&E from those assets with longer service life (buildings).

PPPs for capital input level comparison reflect the ratio of the user cost of capital in domestic currency for a unit of capital input. When there are many different types of capital assets used in production, PPPs for capital input at the industry level is aggregated from data on relative user costs of capital and capital stock by various asset types.

PPPs for output, capital, labour and intermediate inputs at the industry level are all derived from aggregation of the price relatives or PPPs at the detailed product and input levels. For that purpose, two alternative aggregation method can be used: one is CCD multilateral Tornqvist aggregation (Caves, Christensen and Diewert, 1982), the other is based on bilateral comparison.

For CCD multilateral comparison, an artificial reference economy is created as an average of all economies in the data set, and this reference economy is then used as a bridge when making all binary comparisons between two economies. The CCD index is transitive and is base-economy invariant in the sense that all economies are treated symmetrically (Caves, Christensen and Diewert 1982).

Alternatively, one country can be chosen as a benchmark for comparison and all other countries are compared with that benchmark country. But this bilateral index is not transitive and is sensitive to the choice of benchmark country. Therefore, the CCD multilateral index is chosen for constructing PPPs and LA KLEMS productivity level database. That is also the aggregation that is chosen EU KLEMS (Inklaar and Timmer, 2008).

For the presentation of the database, PPPs of gross output, and capital, labour and intermediate input estimated using CCD multilateral index are normalised with Mexico Peso as 1 in the PPP database. When Mexico Peso is normalized as 1, PPPs for a country is the price in local currency of output or inputs that cost one Mexico Peso.

PPPs for gross output, value added, intermediate, capital and labour inputs are all first constructed at the industry level. Those PPPs at the industrial sector are then aggregated to

derive PPPs at the total economy level using the CCD aggregation. For simplicity of the presentation, the subscript for industry will not be explicitly referenced in the estimation equation.

PPPs for gross output, intermediate inputs and value added

The data for constructing the PPPs of gross output at the industry level consists of the relative price of output at the product level and the nominal value of output at the product level. Let p_{ic}^{GO} be the relative price or PPP of product i in domestic currency relative to the US dollars in country c. Let V_{ic} be the nominal value of output for product i that an industry produces in country c. There are a total of I products, and a total of N countries. In this version of the database, I = 72 and N=8 as we work with 72 products and 8 countries. For simplicity of presentation, the subscript for industries is not explicitly referenced. It is also useful to define $v_{ic} = V_{ic} / \sum_{i=1}^{I} V_{ic}$ ($c = 1, 2, ..., N$) as the share of product i in the nominal output of the industry in country c.

As an industry produces multiple products, PPPs or p_{ic}^{GO} at the product level needs to be aggregated to derive the PPPs for gross output at the industry level. For that purpose, the CCD multilateral Tornqvist aggregation is used as that index has a number of desirable properties: it is transitive and base country independent.

To estimate of PPPs of gross output using CCD index, an artificial or benchmark country is created that is the average of the countries, and all countries is then compared with that benchmark countries. In that benchmark country, the price of product i is the geometric average of the relative prices of product i in all countries, $\overline{\ln p_i^{GO}} = \left(\sum_{c=1}^{N} \ln p_{ic}^{GO} \right) / N$, and the share of product i in the nominal value of gross output is the avearge of the nominal share of product i in all countries: $\overline{v}_i = (\sum_{c=1}^{N} v_{ic}) / N$.

The PPPs or relative price of gross output in country c can be written as follows:

(1) $$\ln PPP\_GO_c = \sum_i \hat{v}_{ic} \left(\ln p_{ic}^{GO} - \overline{\ln p_i^{GO}} \right),$$

Where,

- PPP_GO_c : PPP of gross output for country c, expressed in domestic currency relative to the price level of an average country,
- p_{ic}^{GO} : the relative price of output i in country c, expressed in domestic currency relative to US dollars,
- $\overline{\ln p_i^{GO}}$: the geometric average of the price of output i over all countries indexed by c=1,..,N and N is the number of countries, $\overline{\ln p_i^{GO}} = \left(\sum_{c=1}^{N} \ln p_{ic}^{GO} \right) / N$,
- $\hat{v}_{ic} = \left(v_{ic} + \sum_c v_{ic} / N \right) / 2$, where v_{ic} is the nominal share of output i in total nominal output of an industry in country c.

The relative price of output i in country c, expressed in domestic currency relative to US dollars p_{ic}^{GO} is obtained from ICP project (World Bank, 2015).

The same formula is used to estimate PPPs for intermediate inputs (denoted by PPP_II).

PPPs for value added (PPP_VA) is estimated using double deflation and estimates of PPPs of gross output and intermediate inputs. Here we adopt the CCD index for double deflation for consistency with aggregation for other variables, which is essentially equivalent to the procedure adopted in EUKLEMS where a mix of CCD and EKS is adopted. In EUKLEMS, CCD index is used for estimating PPPs of output and intermediate input and the EKS index is then used for the double deflation of value added.[1]

For value added, two alternative PPPs can be used: one based on the deflation of gross output and intermediate input PPPs (in a procedure known as double deflation) and one based on gross output PPP only (single deflation). The choice of the single deflation over double deflation is based on the view that there are inherent measurement errors and large variability that are often associated with double deflation. But for LAKLEMS, the estimates based on double deflation are found to be sensible and robust. Therefore the double deflation for value added is adopted for LA KLEMS.

[1] Essentially, CCD index is the multilateral counterpart of bilateral Tornqvist index, while EKS is the multilateral counterpart of bilateral Fisher index. In practice, both indexes are found to yield similar estimates. But Tornqivt index is commonly used in growth accounting and productivity database. World Bank (2015) provided a detailed discussions of those indexes.

In the productivity and growth accounts such as LA-KLEMS database, productivity is examined from the producer perspective: output is valued at basic price that excludes net product tax, and transport and trade margins, while inputs are valued at purchaser price that includes net product taxes, and transport and trade margins. To be consistent with the growth accounts, the PPPs of output for the level comparison reflects the relatives of basic prices for gross output and the PPPs for inputs are the relatives of purchaser prices for capital, labour and intermediate inputs.

For LA KLEMS, PPPs for gross output, intermediate inputs, and value added at the industrial sector level are aggregated from PPPs at the level of 72 products that comprise industry output and industry intermediate inputs (Table 1).

PPPs of Labour Input

PPPs (PPP_c^L) or the relative price of labour input is the price of labour input in a country in domestic currency compared with the average price of the average economy and it can be written as:

(2) $$\ln PPP\_L_c = \sum_l \hat{v}_{lc} \left(\ln p_{lc}^L - \overline{\ln p_l^L} \right) ,$$

Where,

- PPP_c^L : PPP of labour input for country c, expressed in domestic currency relative to the average price of labour input in an average country.
- p_{lc}^L: the hourly compensation of worker type l in country c, expressed in domestic currency.
- $\overline{\ln p_l^L}$: the geometric average of hourly compensation of worker type l over all countries indexed by c=1,..,N and N is the number of countries. $\overline{\ln p_l^L} = \left(\sum_{c=1}^{N} \ln p_{lc}^L \right) / N$.
- $\hat{v}_{lc} = \left(v_{lc} + \sum_c v_{lc} / N \right) / 2$, where v_{lc} is the nominal share of worker type i in total labour compensation of an industry in country c. $\left(\sum_c v_{lc} / N \right)$ is the average of that share in all economies.

For LA KLEMS, labour is cross-classified by gender (male and female) and age group (15–29, 30–49, and 50 and over) and skill levels (low skilled, medium skilled, and high skilled) for a total of 18 types of workers (Table 2).

If hours worked is homogeneous or no distinction is made between different types of workers with different marginal product or hourly compensation, PPPs or the relative price of labour input will be equal to the ratio of hourly compensation in domestic currency between the two countries, and hours worked is the volume measure of labour input for productivity level comparison. If hours worked is heterogeneous and workers in one country is more educated and more experienced than those in the other country, PPPs of labour input will be different from the ratio of hourly compensation in domestic currency in two countries. This is because PPPs for labour input takes into account the difference in the skill mix of hours worked in the two countries. Essentially, difference in the hourly compensation in the two countries may reflect the difference in the skill mix in the two countries. PPPs of labour input controls for the difference in the skill mix between two countries and it measures the relative price of a unit of labour input in the two countries.

PPPs of Capital Input

Capital input is the flow of capital services derived using capital assets in a period, and the price of capital input reflects the user cost of using capital assets over a period. Therefore the PPPs PPP_c^K of capital input is the relative user cost of capital input in a country in domestic currency compared with the user cost of the average economy and it can be written as:

(3) $$\ln PPP\_K_c = \sum_k \hat{v}_{kc} \left(\ln p_{kc}^K - \overline{\ln p_k^K} \right) ,$$

Where,

- PPP_c^K : PPP of capital input for country c, expressed in the user cost of capital in domestic currency relative to the average user cost of capital in an average country.
- p_{kc}^K : the user cost of capital asset k in country c, expressed in domestic currency.
- $\overline{\ln p_k^K}$: the geometric average of the user cost of capital asset k over all countries indexed by c=1,..,N and N is the number of countries. $\overline{\ln p_k^K} = \left(\sum_{c=1}^{N} \ln p_{kc}^K \right) / N$.

- $\hat{v}_{kc} = \left(v_{kc} + \sum_c v_{kc} / N \right) / 2$, where v_{kc} is the nominal share of asset type k in total capital compensation of an industry in country c. $\left(\sum_c v_{kc} / N \right)$ is the average of that share in all economies.

For LA KLEMS, capital assets are classified into 8 asset types (table 3), residential structures, no-residential structures, transportation equipment, M&E, other products and 3 information technology and communication products (computing equipment, communication equipment, and software. The same depreciation rates are used to estimate capital stock for those 8 assets for all LA economies to provide comparability of capital stock estimates.

The user cost of capital for asset type k in a country c is estimated using the exogenous rate of return and it can be estimated as:

$$p_{kc}^K = p_{kc}^I (\delta_k + \gamma),$$

where p_{ic}^I is the investment price of capital asset k in country in c in domestic currency relative to US dollars, δ_k is the depreciation rate for asset type k and γ is the real rate of return which is assumed to be 4%.

It should be noted that two alternative approaches can be used to estimate the real rate of return and the user cost of capital. For the exogenous or ex-ante approach for estimating the user cost of capital, the real rate of return in set equal to the average real return from markets for bonds or equities. For the endogenous or ex post approach for estimating the user cost of capital, the rate of return is solved from the equation that the sum of user costs of capital across all assets is equal to ex post capital compensation that is often estimated residually as the difference between value added and labour compensation.

The endogenous approach will be preferred approach if there are perfect foresight, constant returns to scale and competitive markets (Jorgenson, Gollop and Fraumeni, 1987). When some of assumptions are not valid or when a set of assets in productivity measurement are not complete, the ex post or exogenous approach is preferred (Diewert, 2000, Schreyer, 2004). The exogenous approach is also preferred for a practical reason as the endogenous rate of return is often volatile and may not represent the cost of using the capital in a period. Baldwin, Gu and

Macdonald (2010) provided detailed discussion about the assumptions required for those two approaches the effect of alternative approaches on the estimates of capital input growth.

For LA KLEMS productivity level database, the exogenous rate of return method is chosen to estimate PPPs and relative levels of capital input and the real rate of return is set equal to 4%. This approach is also adopted in EU KLEMS level database (Inklaar and Timmer, 2008). But this differs from the approach used for estimate the user cost of capital in the LA KLEMS and EU KLEMS productivity growth database where the endogenous rate of return approach is used (Hofman, 2021, Inklaar et al, 2003).

The investment price and PPPs of assets is from the ICP project (World Bank, 2015). For the estimation of the PPPs of capital input, we distinguish five asset types that include ICT, transportation equipment, other M&E, residential structures and non-residential construction. That is because data on PPPs for investment goods are limited from the ICP and no PPPs for separate categories ICTs are available from the ICP.

3. THE LEVEL ACCOUNTING AND KLEMS PRODUCTIVITY LEVEL DATABASE

In this section, we outline the construction of KLEMS productivity level database that makes use of PPPs of output and inputs, and provide the level accounting of labour productivity difference between countries.

The construction of KLEMS level database starts with the construction of the KLEMS level database in the benchmark year (2011 for this database). This includes the relative levels of output, intermediate input, capital and labour input and TFP and labour productivity levels at the sector level for benchmark year 2011. These relative levels of output, inputs and productivity in benchmark year are then extrapolated to other years using the growth rates of those variables. The relative volume measure of gross output in the benchmark year in country c is derived from deflating the nominal value of gross output in domestic currency by the relative price or PPPs of gross output in a country c.

$$Q\_GO_c = GO_c / PPP\_GO_c ,$$

where Q_GO_c is the relative volume of gross output in benchmark year and PPP_GO_c is the PPPs of gross output, and GO_c is nominal output in domestic currency.

Similarly, we can calculate the relative volume of intermediate inputs and value added:

$$Q\_II_c = II_c / PPP\_II_c ,$$ and

$$Q\_VA_c = VA_c / PPP\_VA_c ,$$

where II denotes intermediate inputs and VA denotes value added.

The relative volume measure of labour input in the benchmark year in country c is derived from deflating the nominal value of labour input (which is labour compensation in domestic currency) by the relative price or PPPs of labour input in a country c.

$$Q\_L_c = LAB_c / PPP\_L_c ,$$

where LAB denotes labour compensation in domestic currency.

Similarly, the relative volume measure of capital input in the benchmark year in country c is derived from deflating the nominal value of capital input (which is capital compensation estimated

using exogenous rate of return specification of user cost estimation) in domestic currency by the relative price or PPPs of capital input in a country c.

$$Q\_K_c = CAPE_c / PPP\_K_c,$$

where CAPE is the nominal capital compensation based on the exogenous rate of return estimation of user cost formula. It is equal to capital stock times the user cost of capital, which is equal to $p^K_{kc} = p^I_{kc}(\delta_k + \gamma)$, where γ is exogenous rate of return in real terms.

It should be noted that this ex post capital income estimated using the exogenous rate of return may differ from the capital income in the KLEMS database that reflects ex post capital income and is calculated residually as the difference between nominal value added and labour compensation. The difference may reflect the unmeasured inputs such as intangibles and natural inputs and excess profits (Schreyer 2004).

The relative TFP levels can be based on gross output or value added. The relative TFP level based on gross output involves the comparison of gross output and capital, labour and intermediate inputs and is calculated as follows:

(4)

$$\ln TFP\_GO_c = (\ln Q\_GO_c - \ln Q\_GO) - 0.5(shgoK\_c + shgoK)(\ln Q\_K_c - \ln Q\_K) - 0.5(shgoL\_c + shgoL)(\ln Q\_L_c - \ln Q\_L) - 0.5(shgoII\_c + shgoII)(\ln Q\_II_c - \ln Q\_II)$$

The variables $shgoK_c, shgoL_c, shgoII_c$ are the share of capital income, labour income and in intermediate inputs in nominal gross output in country c. $shgoK$, $shgoL$, $shgoII$ are average share of capital, labour and intermediate inputs in gross output in all countries.

The variables $\ln Q\_GO, \ln Q\_K, \ln Q\_L, \ln Q\_II$ are the geometric averages of the volumes of gross output, capital input, labour input and intermediate inputs in all countries.

The relative TFP level based on value added involves comparison of value added and capita and labour inputs are calculated as follows:

(5)

$$\ln TFP\_VA_c = (\ln Q\_VA_c - \ln Q\_VA) - 0.5(shvaK\_c + shvaK)(\ln Q\_K_c - \ln Q\_K) - 0.5(shvaL\_c + shvaL)(\ln Q\_L_c - \ln Q\_L)$$

The variables $shvaK, shvaL$ are the share of capital income and labour income in value added.

The relative TFP level involve comparison of output with all inputs. But the most commonly used productivity measure is the partial productivity measure such as labour productivity for international comparison. This is generally defined as an output measure divided by hours worked. The labour productivity level based on gross output is estimated by dividing the relative volume of gross output by hours worked. The labour productivity level based on value added can be estimated by dividing value added by hours worked.

$LPGO_c = Q\_GO_c / H_c$, and

$LPVA_c = Q\_VA_c / H_c$,

LPGO is labour productivity based on gross output, LPVA is labour productivity based on value added and H is hours worked

Finally, the relative levels of labour productivity are related to the relative levels of TFP and relative levels of capital and labour compensation according to the level accounting equation:

$$(\ln LP\_VA_c - \ln LP\_VA) = 0.5(shvaK\_c + shvaK)(\ln KPH_c - \ln KPH) + 0.5(shvaL\_c + shvaL)(\ln LPH_s - \ln LPH) + (\ln TFP\_VA_c - \ln TFP\_VA) \quad (6)$$

Where KPH is capital service per hour worked and LPH is labour input per hour worked. According to the level accounting, relative levels of labour productivity can be decomposed into the difference in capital intensity, difference in labour composition and relative MFP level differences.

Similarly, we can relate labour productivity level based on gross output to MFP level based on gross output and the difference in intermediate input per hour worked, capital input per hour worked and labour composition.

As a final step for preparing the KLEMS productivity level database for all years, the estimates of output, inputs and productivity levels in the benchmark year are to be extrapolated to all other years using the gross rates of output, inputs and productivity over time.

As PPPs of gross output, value added and intermediate, capital and labour inputs are normalized with Mexico peso as 1, the volume of output and inputs are expressed in LA-KLEMS productivity level databases is expressed in Mexico pesos. For the presentation of the database and to facilitate the interpretation of the estimates, the volume of output and inputs are converted to US dollars using PPPs for GDP between Mexico and US for year 2011 from ICP. However those

estimates in US dollars cannot be used to derive the relative productivity levels and relative output and input levels between LA economies in the database and the United States. Such comparison requires an extension of the LA KLEMS to include United States and an estimation of PPPs for output and inputs at the industry level between LA countries and the United States.

Labour productivity level is then expressed in US dollars per hour worked, capital input per hour worked is expressed as US dollars per hour worked. It should be noted that relative TFP level and relative labour input per hour worked has no natural units and they will be normalized with Mexico as 1.

4. DATA SOURCES

For this version of LA KLEMS productivity level database, the year 2011 is chosen as benchmark year for calculating PPPs and relative levels of PPPs and productivity. The choice of the reference year is based on the availability of the relative price data for the LA economies. The data on the relative prices used to estimate PPPs for output and intermediate inputs are obtained from the International Comparison Program (ICP). The ICP is a worldwide statistical initiative that estimates purchasing power parities (PPPs) to compare real GDP and its expenditures components (consumption and investment) across participation economies. The ICP program for reference year 2011 covers 199 economies that includes 8 LA economies covered in the LA-KLEMS database on PPPs. The PPPs are available at the basic heading level (155 products) for year 2011 from the ICP. The PPPs are expressed in domestic currency per unit of US dollar.

The two main data sources used for estimating the PPPs of gross output, value added and intermediate inputs are the supply and use tables (SUTs) and PPPs at the basic headings from the ICP.

The supply use tables (SUTs) for Chile, Colombia, Mexico and Costa Rica are from OECD data base on SUTs. The SUTs provide data for 72 products and for 72 industries for Chile and Mexico. For Colombia, the level of industry aggregation is more aggregated, but the level of product aggregation is at 72-product level.

The supply use tables for Dominica Republic, El Salvador, Honduras, and Peru are obtained from LA KLEMS. For those countries, the tables are rectangular and the number of products are more than number of industry in the SUTs. To convert those tables to square tables as in the OECD database, the market share assumption is used. For Honduras, the number of products are small and therefore they are directly mapped to OECD LA KLEMS products.

In sum, the SUTs are available at 72 product and 72 industry levels for most countries (Table 1). To estimate PPP for gross output, intermediate inputs, and value added at the industry level, we work with those 72 product level. For that purpose, the 72 products in the SUTs are mapped to the 155 basic headings in the ICP data to obtain PPPs for those products. While most products in the SUTs are mapped to ICP basic headings, there are 14 products in the SUTs are not mapped to ICP data (Table 4). Those products are primarily used as intermediate inputs. That is because the ICP only provides information on the relative prices of products that are used as final

consumption as the purpose of ICP program is to measure real GDP from the expenditure or final demand side and it does not provide data on the relative prices of products that are used for intermediate inputs. Those products not matched to ICP basic headings include forestry, mining products, metals products, chemicals and etc. For most of those products that are traded on international markets, we used exchange rates as proxy for those PPPs. For other products, we use GDP deflator as a proxy.

Another complication arises when the multiple products at the basic heading level is mapped to one product used for estimating industry PPPs. For example, the products at the basic headings such as rice, Fresh or chilled vegetables, Fresh or chilled potatoes Frozen are mapped to the products of agriculture, hunting and related services used at the SUT product level. The aggregation of the product headings to the SUT products are based on the expenditure data at the national level that is available from ICP. Ideally, the aggregation should be based on the production and intermediate inputs data for the estimation of PPPs for output and intermediate input. But such data are not available

In the KLEMS database, gross output is valued at basic price and intermediate input is valued at purchaser price. The relative prices in ICP reflects the market price or purchaser price. To calculate PPPs for gross output, the PPPs from ICP needs to be converted to basic prices by peeling off the tax and transport margins as in Jorgenson, Kuroda, and Nishimizu (1987), Inklaar and Timmer (2008) and Baldwin, Gu and Yan (2008). To calculate PPPs for intermediate inputs, the ICP PPPs can be used as the valuation is the same between ICP and the KLEMS productivity database (purchaser price). Those margins rates and tax rates are available from the SUTs.

The data used for estimating the PPPs of labour input consist of the hourly compensation and hours worked by types of workers which are available from the LA KLEMS growth accounts. The data used for estimating the PPPs of capital input consists of capital stock by assets types which are available from the LA KLEMS growth accounts and relative price of investment assets that are available from the ICP.

5. CONTENT AND COVERAGE OF LA KLEMS PRODUCTIVITY LEVEL DATABASE

The LA KLEMS productivity level database presents data on the PPPs (or relative price levels) of output and capital, labour, and intermediate inputs at the industry level for eight LA economies for the reference year 2011. It also provides data on the relative levels of output and inputs and labour and total factor productivity for the total economy and 9 major industry sectors over the period 1990 to 2016. The 9 industry sectors are the level of the industry aggregation at which LA KLEMS database is constructed (Hofman et al. 2016).

Economies covered

- Eight LA economies: Chile, Colombia, Costa Rica, El Salvador, Honduras, Mexico, Peru and the Dominican Republic

Sectors covered: total economy and 9 sectors of the total economy

- Total economy TOT
- Agriculture, hunting, forestry, and fishing AtB
- Mining and quarrying C
- Total manufacturing D
- Electricity, gas, and water supply E
- Construction F
- Wholesale, retail trade, and hotels and restaurants GtH
- Transport and storage and communication I
- Finance, insurance, real estate, and business services JtK
- Community social and personal services LtQ

Relative prices (PPPs) of output and inputs for 2011 (Mexico =1)

- PPP_GO PPP for gross output
- PPP_II PPP for intermediate inputs
- PPP_VA PPP for value added (double deflated)
- PPP_L PPP for labour
- PPP_K PPP for capital

Nominal value all in local currency, 000s, unless specified otherwise

- GO Gross output at current basic prices

- II Sectoral intermediate inputs at current purchase prices
- VA Gross value added at current basic prices
- LAB Labour compensation
- CAP Capital compensation
- HOURS Total hours worked in thousands

Volume index, levels in US dollars, in 000s, unless specified otherwise

- Q_GO Gross output
- Q_II, Intermediate inputs
- Q_VA Value added
- H Hours worked, 000s
- Q_LAB Labour input
- Q_CAP Capital input
- LP_VA Gross value added per hour worked, US dollar per hour worked
- LP_GO Gross output per hour worked, US dollar per hour worked
- MFP_VA Total factor productivity (value added based), Mexico = 1
- MFP_GO Total factor productivity (Gross output based), Mexico =1
- LAB_QPH Labour input per hour worked, Mexico =1
- CAP_QPH Capital input per hour worked, US dollar per hour worked

6. MAIN RESULTS

In this section, we present some main results of the PPP database. PPPs is normalized with Mexico as one.

Table 5. PPPs of gross output, intermediate inputs and value added, 2011, Mexico= 1

	Chile	Colombia	Costa Rica	Dominican Republic	El Salvador	Honduras	Mexico	Peru
Gross output								
Tot	45.74	153.12	44.65	2.67	0.07	1.40	1.00	0.21
AtB	58.10	176.27	71.48	2.81	0.10	1.70	1.00	0.22
C	53.89	172.35	48.37	4.13	0.08	1.60	1.00	0.26
D	45.26	161.64	48.46	3.41	0.08	1.69	1.00	0.24
E	45.09	117.93	23.68	2.49	0.05	1.58	1.00	0.16
F	37.09	129.32	35.27	2.20	0.06	1.04	1.00	0.17
GtH	45.21	152.00	42.88	2.35	0.07	1.46	1.00	0.21
I	38.30	152.01	28.25	2.02	0.03	0.97	1.00	0.16
JtK	39.10	107.09	28.36	1.92	0.05	0.83	1.00	0.14
LtQ	61.33	220.89	95.21	3.00	0.09	1.96	1.00	0.28
Intermediate inputs								
Tot	44.01	143.15	39.08	2.56	0.07	1.26	1.00	0.19
AtB	45.72	150.92	44.49	2.83	0.08	1.40	1.00	0.20
C	39.15	142.72	33.99	2.40	0.06	1.17	1.00	0.18
D	47.81	144.79	44.25	2.81	0.08	1.42	1.00	0.21
E	50.14	132.69	37.08	2.59	0.07	1.40	1.00	0.20
F	40.14	139.27	39.63	2.58	0.07	0.98	1.00	0.20
GtH	39.49	135.54	34.66	2.23	0.06	1.09	1.00	0.17
I	40.22	146.31	33.16	2.39	0.06	1.19	1.00	0.19
JtK	39.55	125.77	29.20	1.95	0.06	0.98	1.00	0.15
LtQ	40.70	135.47	34.38	2.29	0.06	1.14	1.00	0.17

Value added								
Tot	47.15	161.23	49.45	2.71	0.07	1.54	1.00	0.21
AtB	72.71	201.20	114.82	2.86	0.13	2.01	1.00	0.24
C	60.66	182.52	56.23	6.36	0.08	1.81	1.00	0.29
D	42.84	206.51	59.45	4.80	0.10	2.60	1.00	0.32
E	41.43	104.91	15.05	2.28	0.03	2.52	1.00	0.14
F	34.56	121.79	31.23	1.33	0.05	1.12	1.00	0.15
GtH	47.94	158.29	48.13	2.26	0.08	1.70	1.00	0.23
I	37.45	162.11	24.68	1.70	0.02	0.80	1.00	0.14
JtK	39.06	101.97	28.25	1.92	0.05	0.79	1.00	0.13
LtQ	69.43	256.69	127.45	3.25	0.10	2.30	1.00	0.33
Addendum								
Exchange rate, 2011	38.93	148.76	40.70	3.07	0.08	1.52	1.00	0.22
GDP PPP, 2011, ICP	45.36	151.43	45.19	2.53	0.07	1.29	1.00	0.20

Source: Authors' calculation.

Table 5 presents PPPs of gross output, intermediate inputs and value added for year 2011. For comparison, the table also presents the PPPs for GDP in total economy from the ICP. For the total economy, PPPs for value added are similar to the ones from the ICP that reflects the PPPs from the final demand side of GDP. This is re-assuring as our estimates of PPPs are estimated from production side and using double deflation. The other difference is PPPs for value added for KLEMS level is based on the valuation of basic price. In contrast, PPPs for value added from ICP is based on the valuation of market prices that differs from the valuation of basic price by trade and transport margins and net product taxes.

There are inter-industry differences in PPPs of gross output, intermediate inputs and value added across industries due to the difference in industry output mix and intermediate input mix. This suggests that it is important to estimate PPPs at the industry side if we want to have accurate estimates of industry productivity levels.

Table 6 presents PPPs of capital and labour inputs for year 2011. The PPPs of capital input is estimated using equation (3) while the PPPs of labour input is estimated using equation (2). The PPPs of capital input reflects the ratio of the user cost for a unit of capital input in domestic currency between the two countries, while the PPPs of labour input represents the ratio of the price of a unit of labour input in domestic currency between the two countries where workers are classified by age, gender, and education.

The estimates in Table 6 show that the ratio of the price for a unit of labour input in domestic currency between Chile and Mexico is about 17.74 in 2011 at the total economy level. There are differences in PPPs of labour input across industries. Those inter-industry differences are partly due to differences in labour input used in different industries in the two countries, and partly due to the difference in the relative price of a unit of labour input in different industries in the two countries. If the labour market is perfectly competitive and labour are fully mobile, the hourly compensation will be equalized across industries and the difference in PPPs of labour input between industries will only reflect the difference in the relative price of labour input between industries.

The estimates in Table 6 also show that the PPPs of capital input are similar across industries. It is assumed that the user cost of capital for an asset is the same across all industries as the same exogenous rate of return is used to estimate the user cost of capital in all industries. This implicitly assumes that capital market is perfectly competitive and the rate of return is equalized across

industries. The difference in PPPs of capital input between industries in Table 6 therefore is due to the difference in asset mix or capital input between industries.

Table 6. PPPs of capital and labour inputs, 2011, Mexico = 1

	Chile	Colombia	Costa Rica	Dominican Republic	El Salvador	Honduras	Mexico	Peru
Capital input								
Tot	46.55	158.33	42.99	2.76	0.07	1.34	1.00	0.21
AtB	44.63	165.32	47.30	3.15	0.07	1.44	1.00	0.24
C	56.48	174.95	45.74	2.96	0.07	1.39	1.00	0.23
D	44.51	175.67	48.55	3.30	0.08	1.53	1.00	0.24
E	54.57	169.02	42.47	2.86	0.07	1.35	1.00	0.21
F	41.57	181.60	53.45	3.31	0.08	1.57	1.00	0.26
GtH	53.02	187.28	46.06	2.95	0.08	1.55	1.00	0.24
I	49.18	185.56	55.06	3.19	0.09	1.72	1.00	0.26
JtK	35.39	131.54	36.89	2.34	0.06	1.11	1.00	0.18
LtQ	59.52	170.07	41.18	2.81	0.07	1.34	1.00	0.20
Labour input								
Tot	17.74	75.84	27.11	1.51	0.04	0.76	1.00	0.11
AtB	94.57	156.35	69.72	2.07	0.07	2.22	1.00	0.27
C	10.79	87.76	15.16	4.92	0.09	0.46	1.00	0.27
D	20.56	98.67	32.51	2.46	0.06	1.11	1.00	0.14
E	6.13	60.61	25.31	1.76	0.04	1.31	1.00	0.12
F	19.20	108.39	32.40	3.45	0.04	0.78	1.00	0.19
GtH	39.43	117.74	44.72	2.67	0.05	1.14	1.00	0.17
I	15.65	67.84	27.14	0.87	0.05	1.12	1.00	0.12
JtK	8.08	95.85	24.77	1.87	0.05	1.29	1.00	0.16
LtQ	24.85	50.90	18.04	0.79	0.03	0.30	1.00	0.06

Source: Authors' calculation.

The LA KLEMS level database provide two measures of labour and total factor productivity, one is based on value added and the other is based on gross output. It is often argued that productivity measure based on gross output is the right measure at the industry level, as gross output reflects the production of goods and services. For the total economy level, value added is the right concept as it is more closely related to the living standards and gross output measure at the total economy level is sensitive to the degree of integration in production and is subject to the double counting of intermediate inputs between industries (Schreyer 2001).

Table 7 presents labour productivity and total factor productivity level that is based on value added in 2016 with Mexico normalized as 1. Chile has the highest labour productivity level, followed by Mexico. Honduras and El Salvador have the lowest labour productivity levels. The high labour productivity level in Chile is partly due to the high capital intensity (shown in Table 9). As a result, the TFP level in Chile is actually lower than that in Mexico in 2016. In general, the differences TFP levels between countries are smaller than the differences in labour productivity levels as the cross-country differences in labour productivity levels are partly due to the cross country difference in capital intensity and labour skills (as shown in Table 9).

Table 7. Labour and total factor productivity based on value added in 2016, Mexico=1

	Chile	Colombia	Costa Rica	Dominican Republic	El Salvador	Honduras	Mexico	Peru
Value added per hour worked								
Tot	1.11	0.53	0.54	0.51	0.26	0.22	1.00	0.36
AtB	0.98	0.44	0.26	0.50	0.13	0.23	1.00	0.25
C	0.55	1.02	0.32	0.83	0.17	0.03	1.00	0.52
D	1.33	0.54	0.64	0.45	0.22	0.15	1.00	0.32
E	1.25	1.28	0.85	0.60	1.64	0.21	1.00	1.04
F	1.90	1.18	0.92	2.65	0.54	0.22	1.00	0.74
GtH	0.69	0.26	0.35	0.50	0.12	0.17	1.00	0.21
I	1.25	0.37	1.08	1.11	1.43	0.40	1.00	0.49
JtK	1.13	0.51	0.62	0.50	0.34	0.28	1.00	0.45
LtQ	0.71	0.49	0.32	0.34	0.27	0.32	1.00	0.30
TFP based on value added								
Tot	0.77	0.53	0.64	0.68	0.60	0.49	1.00	0.67
AtB	1.43	1.18	0.74	1.91	0.39	1.01	1.00	1.33
C	0.54	1.03	1.68	0.69	0.90	0.24	1.00	1.36
D	1.23	0.67	0.61	0.57	0.53	0.34	1.00	0.74
E	0.88	0.79	1.37	0.93	3.87	0.11	1.00	1.77
F	0.58	1.22	0.61	2.06	0.63	0.29	1.00	0.95
GtH	1.16	0.51	0.83	0.70	0.36	0.68	1.00	0.73
I	0.53	0.29	1.06	0.92	2.74	0.59	1.00	1.04
JtK	2.32	1.40	1.63	1.02	1.23	2.13	1.00	1.19
LtQ	0.44	0.21	0.17	0.34	0.33	0.31	1.00	0.25

Source: Authors' calculation.

Table 8 presents labour productivity and total factor productivity level that is based on gross output in 2016 with Mexico normalized as 1. The differences mirror the differences for productivity measures that are based on value added in Table 7.

Table 9. Relative capital input and labour input per hour worked in 2016

	Chile	Colombia	Costa Rica	Dominican Republic	El Salvador	Honduras	Mexico	Peru
Capital input per hour worked, US dollar per hour worked								
Tot	4.49	3.27	3.54	3.20	1.71	2.06	7.40	1.92
AtB	2.51	0.55	0.69	0.26	0.99	0.56	3.74	0.28
C	29.64	37.77	5.23	64.03	5.18	4.26	54.50	15.56
D	4.01	3.53	6.48	4.81	2.29	2.21	7.21	1.81
E	38.86	72.50	22.70	24.66	15.32	101.98	45.16	21.45
F	1.85	0.53	1.46	1.24	0.95	0.78	0.84	0.57
GtH	0.88	0.55	0.94	1.38	0.38	0.27	3.51	0.37
I	9.24	4.38	4.12	3.61	2.65	4.48	5.67	1.60
JtK	5.50	7.69	9.18	17.96	10.49	4.17	46.17	14.34
LtQ	2.12	3.37	2.10	0.77	0.76	2.87	4.99	2.31
Labour input per hour worked, Mexico = 1								
Tot	3.28	2.01	1.50	1.35	0.82	0.75	1.00	1.05
AtB	0.71	1.19	0.91	1.37	0.63	0.50	1.00	0.60
C	6.80	3.51	1.88	1.45	0.91	0.54	1.00	1.19
D	3.04	1.66	1.45	1.01	0.68	0.79	1.00	0.94
E	6.65	1.41	1.09	1.09	0.89	0.93	1.00	1.21
F	4.66	1.49	1.44	1.14	0.66	0.70	1.00	0.88
GtH	1.51	1.37	0.86	1.63	0.87	0.66	1.00	0.75
I	3.43	1.96	1.44	2.36	0.55	0.61	1.00	0.77
JtK	12.56	2.47	2.05	1.28	0.69	0.48	1.00	0.94
LtQ	1.79	2.52	2.09	1.23	0.93	1.06	1.00	1.30

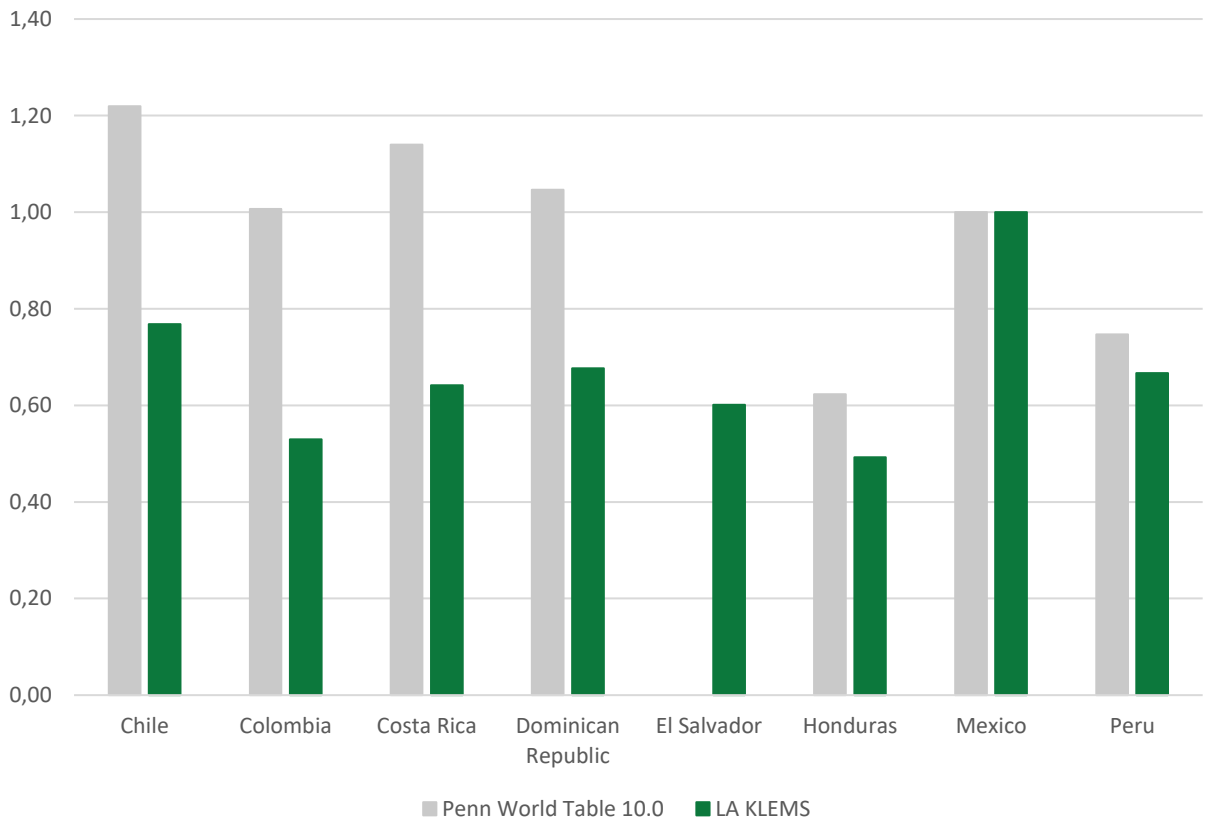
Source: Author´s elaboration.

The Penn World Table (PWT) has been providing an international comparison of GDP per capita across countries, which is recently expanded to include a comparison of TFP levels on value added at the total economy level across countries (Feenstra and Inklaar, 2013). But the PWT does not provide information on TFP level differences at the industry level across countries which is important if we want to understand the TFP level at the industry level and their contribution to the overall TFP level differences at the total economy level. Such information on TFP level at the industry level is available from LA KLEMS for comparison of LA economies and EU KLEMs for comparison of EU economies.

Figure 1 presents the TFP level for 8 LA economies from LA KLEMS and PWT 10. TFP level for El Salvador is not available from the PWT. There are large differences in the two estimates. LA KLEMS shows that Mexico has the highest TFP level while PWT shows that Chile, Colombia, Costa Rica, Dominican Republic all have the TFP level that are higher than that in Mexico. While both LA KLEMS and PWT use PPPs from ICP, PWT makes adjustment to PPPs of government

services from ICP for the differences in productivity in the provision of government services (Feenstra and Inklaar, 2013). Therefore, some of the differences could be due to the adjustment that PWT made to PPPs for government services from ICP. Other differences could be due to the fact that PWT includes close to 200 economies that are at the various stage of development. The aggregation index that is adopted by PWT that make use of information for all those 200 economies could impact the final estimates for LA economies. There are also differences in the estimation method of labour input and capital input. While both PWT and LA KLEMS use the concept of capital and labour input that accounts for the difference in asset mix and skill mix, the exact implementation are different.

Figure 1. Total factor productivity level in total economy, 2016: PW 10.0 vs LA KLEMS, Mexico =1



7. CONCLUSIONS

In this technical documentation, we have presented the methodology and data sources for estimating the purchasing power parities (PPPs) of inputs and output at the industry level in Latin America. We have also presented the methodology for estimating relative levels of output and inputs and labour and total factor productivity that makes use of the estimated PPPs. The estimates of relative labour and total factor productivity levels in Latin America are presented in this paper. Those estimates should be viewed preliminary and are presented to solicit comments and feedbacks so that the improvement can be made in the future revision to those estimates.

Our work has also highlighted many data challenges for constructing the KLEMS productivity level database.

The PPPs of output and inputs are sensitive to the level of dis-aggregation for output and inputs. Ideally, the increase in the product details will improve accuracy of the estimates of PPPs and relative productivity levels.

The ICP provides data on PPPs for products that are used for final expenditures. No data are available for products that are used for intermediate inputs. The progress needs to be made to collect PPPs for intermediate products to improve the accuracy of relative productivity levels. A recent attempt that combine ICP data and unit costs from the production survey from the national statistical agencies to estimate PPPs for productivity level comparison is documented in Inklaar and Timmer (2016).

The PPPs for investment goods need to be expanded to include more investment goods such as information and communication products. The other challenge is related to PPPs of services such as health and education and no-market services. The improved estimates of PPPS for those service products are needed to have accurate estimates of productivity levels for those service industries.

The comparability of output and inputs needs to be carefully examined for constructing KLEMS productivity level database. We will need to carefully examine the concept, survey and estimation methods used to estimate those variables. We hope that our estimates will serve as starting point for those improvement.

We would like to mention potential future improvement and revision to the database.

The benchmark year chosen for this version of the database is 2011. The PPPs may be sensitive to the benchmark year as the product and input mix change over time. The accuracy of the productivity estimates for more recent years require the updating of PPPs for more recent years.

The usefulness of the database will improve as the number of countries (especially major trading partner and productivity frontiers such as the United States) are expanded.

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Annexes

Table A1. The list of products used for PPP calculation

Sequential number	Products
1	Products of agriculture, hunting and related services
2	Products of forestry, logging and related services
3	Fish & other fishing products, aquaculture prod., support serv. to fishing
4	Coal and lignite
5	Crude petroleum and natural gas
6	Metal ores
7	Other mining and quarrying products
8	Mining support services
9	Food, beverages and tobacco products
10	Textiles, wearing apparel, leather and related products
11	Wood & prod. of wood & cork, exc. furniture, of straw & plaiting materials
12	Paper and paper products
13	Printing and recording services
14	Coke and refined petroleum products
15	Chemicals and chemical products
16	Basic pharmaceutical products and pharmaceutical preparations
17	Rubber and plastic products
18	Other non-metallic mineral products
19	Basic metals
20	Fabricated metal products, except machinery and equipment
21	Computer, electronic and optical products
22	Electrical equipment
23	Machinery and equipment n.e.c.
24	Motor vehicles, trailers and semi-trailers
25	Other transport equipment
26	Furniture and other manufactured goods
27	Repair and installation services of machinery and equipment
28	Electricity, gas, steam and air conditioning
29	Natural water, water treatment and supply services
30	Sewerage services, sewage sludge, waste collection & management serv.
31	Buildings and building construction works
32	Constructions and construction works for civil engineering
33	Specialised construction works
34	Wholesale and retail trade and repair serv. of motor vehicles & motorcycles
35	Wholesale trade services, except of motor vehicles and motorcycles
36	Retail trade services, except of motor vehicles and motorcycles

37	Land transport services and transport services via pipelines
38	Water transport services
39	Air transport services
40	Warehousing and support services for transportation
41	Postal and courier services
42	Accommodation services
43	Food and beverage serving services
44	Publishing services
45	Audiovisual and broadcasting services
46	Telecommunications services
47	Computer programming, consultancy and related serv., Information serv.
48	Financial services, except insurance and pension funding
49	Insurance, reinsurance & pension funding services, exc. compulsory S.S.
50	Services auxiliary to financial services and insurance services
51	Imputed rents of owner-occupied dwellings
52	Real estate services excluding imputed rents
53	Legal, accounting, head offices services, management consultancy serv.
54	Architectural and engineering services, tech. testing & analysis services
55	Scientific research and development services
56	Advertising and market research services
57	Other professional, scientific and tech. services and veterinary services
58	Rental and leasing services
59	Employment services
60	Travel agency, tour operator & other reservation services & related serv.
61	Security & investigation serv., serv. to buildings & other business support
62	Public administration and defence services, compulsory S.S. services
63	Education services
64	Human health services
65	Residential care services, social work services without accommodation
66	Creative, arts, entmnt, library, museum, other cult. serv., gambling serv.
67	Sporting services and amusement and recreation services
68	Services furnished by membership organisations
69	Repair services of computers and personal and household goods
70	Other personal services
71	Services of households as employers of domestic personnel
72	Undifferentiated goods and services produced by private HH for own use

Table A2. Worker Types in LA KLEMS

Characteristics	Categories
Gender	Female, Male
Age	Aged 15–29, Aged 30–49, Aged 50 and over
Education	Low skilled, Medium skilled, High Skilled

Table A3. Asset types in LA-KLEMS

Broad asset categories	Asset type
Total construction	Residential structures
	Total non-residential investment
Non-information and communication equipment (ICT) M&E	Transport equipment
	Machinery and equipment
	Other products
ICT	Computing equipment
	Communications equipment
	Software

Table A4. The list of products that have no information on PPPs from ICP

Products of forestry, logging and related services
Metal ores
Other mining and quarrying products
Mining support services
Paper and paper products
Printing and recording services
Coke and refined petroleum products
Chemicals and chemical products
Rubber and plastic products
Basic metals
Wholesale and retail trade and repair serv. of motor vehicles & motorcycles
Wholesale trade services, except of motor vehicles and motorcycles
Retail trade services, except of motor vehicles and motorcycles
Undifferentiated goods and services produced by private HH for own use