



Productivity in the European Union: A Comparative Industry Approach UPDATE ON THE EU KLEMS PROJECT¹

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Abstract

This note gives a short update on the progress being made on the EU KLEMS project since the first OECD Productivity Meeting in October 2006 (see van Ark, 2006). It briefly summarizes the achievements during the past year (September 2005-August 2006; the second year of the EU KLEMS project) and the plans for the final phase of the project (September 2006-December 2007).

Participants from National Statistical Institutes are invited to make comments on and suggestions for the final phase of the project and make suggestions for the implementation of the EU KLEMS methodology in productivity accounts for EU countries (as well as other non-European OECD countries).

Workshop participants who are interested in the range of possible applications of the EU KLEMS results are referred to the paper by Inklaar et al. which will be presented in this session, making use of pre-EU KLEMS data.

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1. General project objectives of EU KLEMS

Growth and competitiveness have become major sources of concern within the European Union, as appears for example from the increased pressure to comply with the Lisbon and Barcelona goals of the Union which aim to support competitiveness and raise R&D performance. The urgency to better grasp the causes of Europe's growth deficit has been underlined in the mid term-review (2004) by the Kok Commission of the Lisbon agenda which argued for a stronger focus on the need to boost its economic growth rate and increase employment.

To adequately conduct policies that support a revival of productivity and competitiveness in the European Union, comprehensive measurement tools are needed to monitor and evaluate progress. In this regard the EU makes extensive use of the Structural Indicators, which includes a wide range of indicators measuring European policy targets, including GDP per capita, labour productivity, the employment rate, educational attainment, R&D expenditure, etc.. Unfortunately the Structural Indicators do not provide an analytical framework that can establish the relationship between those indicators. Hence it provides insufficient policy guidance on how the various policy targets interact. Moreover, the Structural Indicators do not provide industry detail, which has proven to be very important for understanding differences in economic performance.

The *major aim* of the EU KLEMS project (see <http://www.euklems.net>) is to fill this void by providing growth and productivity accounts for all its member states and to carry out research projects analyzing various aspects of the European growth agenda.

The *primary objective* of the project is the construction of the EU KLEMS Growth and Productivity Accounts. This research database should facilitate the sustainable production of high quality statistics on economic growth, productivity, employment creation, capital formation and technological change in the European Union at industry level. The EU KLEMS Growth and Productivity Accounts will include quantities and prices of output, capital (K), labour (L), energy (E), material (M) and services (S) inputs at the industry level. Output and productivity measures are provided in terms of growth rates and (relative) levels. Additional measures on knowledge creation (R&D, patents, embodied technological change, other innovation activity and co-operation) will also be developed. These measures are developed for individual European Union member states, and will be also linked with "sister"-KLEMS databases in the U.S., Canada and Japan. Indeed, a next step in this work will be the development of a WORLD KLEMS growth and productivity accounts.

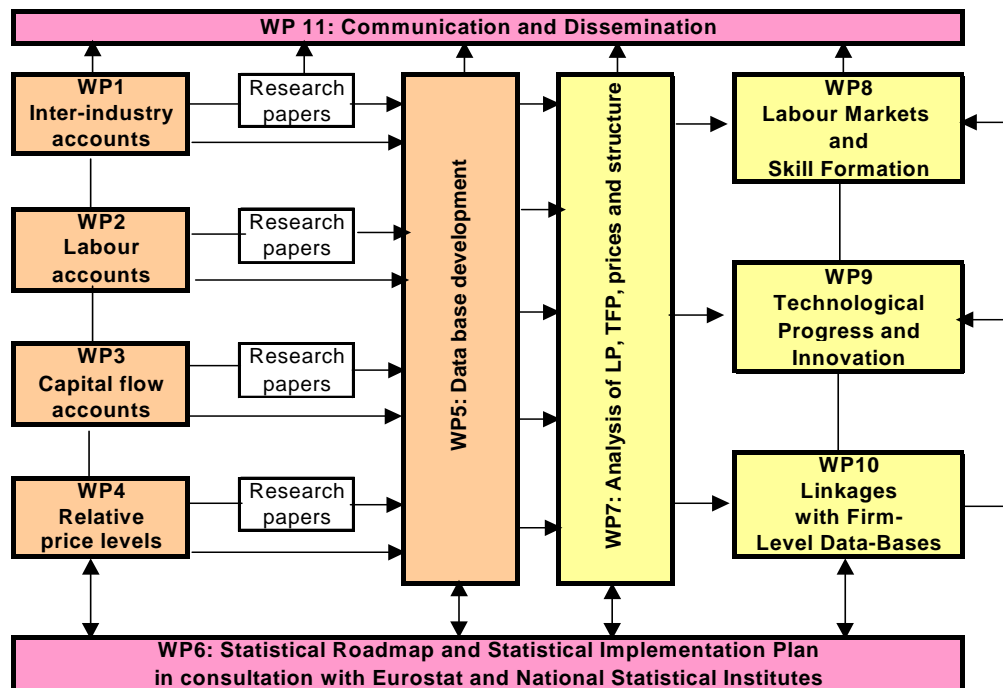
The construction of the EU KLEMS database is not simply a data exercise, but involves a substantial amount data and methodological research. During the first project year, much of the activity has focused on this work, including an investigation of data availability and the preparation a substantial amount of notes and papers on methodological issues concerning the data. In the second year the focus has shifted to the real construction of the database. A substantial part of the time was spent on the checking of the data. Country specific data has been checked on reliability, both by internal checks and cross-checks with other countries and variables.

A *second objective* of the EU KLEMS project is to initiate research projects in some key areas related to Europe's growth and competitiveness issues. In addition to the periodic analysis of productivity, prices, industry structure and technology and innovation indicators, this will also involve projects in the following three areas: labour market and skill creation, technological progress and innovation, and linkages of the EU KLEMS industry level data to firm level databases. During the first reporting year, preparatory activities have been undertaken to initiate these project during the second year of the project.

A *third objective* of the EU KLEMS project is to facilitate the continuation of the maintenance and extension of the EU KLEMS Growth and Productivity Accounts upon completion of the project. To this end substantial activity is undertaken to involve in particular National Statistical Institutes (NSI's) but also Eurostat and OECD in the construction of the database, the provision of basic data, in obtaining feedback on the quality of the database and – in due course – in the implementation of the accounts in the NSI's own statistical programme.

These objectives are reflected in the Workpackages setup of the EU KLEMS project (see Figure 1). Workpackages 1-5 deal with the construction of the database, workpackages 7-10 with the analytical research, and workpackages 6 and 11 deal with the communication with National Statistical Institutes and other third parties respectively.

Figure 1: Workpackages in EU KLEMS project



2. EU KLEMS relative to state-of-the-art

Relative to the state-of-the-art, the EU KLEMS project will provide comprehensive and internationally consistent growth and productivity accounts for individual European countries also relative to other advanced countries in the world. Previous KLEMS-type growth accounting studies are mostly carried out over time for individual countries and industries. Recently, growth accounts have received renewed interest to study the effects of ICT on growth (Colecchia and Schreyer, 2002, Basu et al., 2004; Timmer and van Ark, 2005, Jorgenson et al., 2005; Inklaar et al. 2006). Growth accounts measures by industry, including a breakdown for ICT assets, are now available from the Groningen Growth and Development Centre (GGDC) for seven countries (Australia, Canada, France, Germany, Netherlands, UK and USA) but only with national accounts-based value added as the output concept.

The EU KLEMS accounts will include time (1970 to present), industry (72 industries) and the country dimensions (25 EU member states). The European dataset will also be linked with Canada-Japan-USA databases to allow for international comparisons (see e.g., Gu, Lee and Tang, 2001; Jorgenson and Nomura, 2005; Fukao et al, 2006). Also a consortium coordinated by RIETI in Japan is developing an Asian database, called the ICPA–database (International Comparison of Productivity among Asian countries; see <http://www.rieti.go.jp/en/database/data/icpa-description.pdf>) along the same lines

as EU KLEMS, for China, Japan, Korea and Taiwan. Links between EU KLEMS and these databases will allow for truly global comparisons of growth and productivity.

The EU KLEMS growth accounts are based on the principles as established in the latest System of National Accounts (1993) and the European System of Accounts (1995). In particular the recommendations to move towards the use of an input-output system for the construction of national accounts, the use of chain indices for the measurement of prices and quantities, and the capitalization of software are key ingredients for improved productivity measurement using a KLEMS input structure. Most recently the various methods to measure output, productivity and (capital) inputs have been described in two OECD documents (OECD, 2001a, 2001b) and in two Eurostat manuals (Eurostat, 2001, 2002). OECD (2005) provides national accounts-based productivity measures from a range of OECD countries.

As mentioned above, the EU KLEMS Growth and Productivity Accounts is intended to be available for National Statistical Institutes (NSIs) for future implementation in official statistical practice. At the same time the database is intended to explore new methodological applications and to maximize international comparability for economic and policy research. Hence the accounts will consist of two interdependent modules:

- The *Analytical Module* is the core of the EU KLEMS accounts. It provides a (research) database at the highest possible quality standards for use in the academic world and by policy makers. It uses “best practice” techniques in area of growth accounting, focuses on international comparability, and aims at full coverage (country * industry * variable) at least for the revision period of the national accounts. It will also consider alternative or pioneering assumptions regarding statistical conventions on, for example, the output and price measurement of ICT goods and non-market services, comparisons of skill levels, the measurement of capital services and the capitalization of intangible assets.
- The *Statistical Module* of the database will be developed parallel to the analytical module. It includes data which are as much as possible consistent with those published by NSIs. Its methods will usually correspond to the rules and conventions on national accounts, supply and use tables, commodity flow methods, etc. (SNA 1993, ESA 1995), and any deviations from these standard rules should at least be supported by the NSIs.

The EU KLEMS project is an interactive project, in which a clear trajectory is established that allows for a convergence between the analytical and statistical modules of the databases in due time. To achieve this, the EU KLEMS consortium will continuously seek NSIs advice to work jointly on aspects of the database and to

ensure that the pioneering methodologies are further improved to achieve the statistical standards of NSIs, so that the data produced within the analytical module (once meeting the NSI standards) can be transferred to the statistical module. Alternatively, data produced within the analytical module (that do not meet statistical standards adopted by the NSIs) will remain in the database of the analytical module.

3. Main achievements during the second year of EU KLEMS

During the second project year preparations have been made for the construction of the EU KLEMS database and for the initiation of the main research projects.

In March 2006, the preliminary version of the EU KLEMS database (D4) has been released through the EU KLEMS website (<http://www.euklems.net>). The preliminary version of the database has been accompanied by a Manual on *EU KLEMS Growth and Productivity Accounts: Preliminary Analytical Database*, consisting of two parts (PART 1: Methodology and PART 2: Sources).

The preliminary version of the EU KLEMS database has been made available to all consortium partners, the European Commission and the National Statistical Institutes. NSI's have been asked to provide feedback, and such feedback from about 12 European NSI's. On the whole NSIs have reacted positively to the developments in EU KLEMS, but there are some major concerns as well:

- One main concern has been the need to improve the traceability of the derived series to the original data as provided by the NSIs. This will be addressed in the preparation of the first public database.
- For the smaller countries, in particular, the level of industry detail and the number of variables in EU KLEMS is a major concern, and leads to questions on how detailed the series in the database should be.
- Several NSIs have indicated concerns about the relationship between the analytical module (to which NSIs cannot be committed) and the statistical module (which in some cases may be run by the NSIs themselves – such as in the Netherlands – and in other cases by the EU KLEMS consortium).
- Finally, several NSIs have mentioned that they cannot commit any resources to historical series, i.e. series that beyond the revision period they are presently working on. This issue will be addressed by the consortium through providing a clearer split between revision series and historical series in the database.

In addition to communication with the individual NSI's, communication has also been supported by presentations of the EU KLEMS project for the National Accounts

Working Group (NAWG) of Eurostat (15 May 2006), the Economic Policy Committee of the European Commission (22 May 2005) and at a meeting of the EPROS network (1-2 June 2005).

At the third internal meeting of the EU KLEMS consortium in Valencia in May 2006, the results of the preliminary database and the feedback was discussed and implications for the next steps in preparation of the public version of the database were discussed. The feedback period on the preliminary database was closed at the end of September. The progress on communication and outcomes of the discussions has been reported in the third Statistical Progress Report. Individual reports of visits to NSI's will be included with the fourth Statistical Progress Report in October 2006.

On the analytical research the consortium has prepared a range of research plans in the area of productivity analysis, labour market, technology and innovation and links to firm level research (WP7-10). In December 2005, three survey papers were presented at a workshop at the premises of the European Commission in Brussels. In total the survey papers contained 31 proposals for research projects to be carried out by the consortium during the final phase of the project. Following feedback from the Commission (see below) and additional discussions within the consortium the number of proposals has been reduced to a smaller number of approximately 20 proposals. In January 2006 DG ECFIN (on behalf of the Commission) has send a detailed report with suggestions (such as more emphasis on stress testing of the data). At the consortium's meeting in Valencia in May 2006, several papers related to the analytical workpackages were presented. For reports and papers, see <http://www.euklems.net> under "events". Plans have also been made for joint publications of the Consortium, including the EU KLEMS Productivity Report (March 2007) and three EU KLEMS volumes (see below).

4. Activities and publications during the final phase of EU KLEMS

Although the objectives of the EU KLEMS project have been largely met during the second year, the construction of the preliminary version of the dataset appeared more time consuming, and the release was postponed from November 2005 to March 2006. This also implied a later start of the feedback phase on the preliminary dataset.

As a result, the next steps in the project were also somewhat postponed. Data delivery for the first public version of the database was extended to September 2006, and the release of the preliminary database of EU KLEMS, originally scheduled for August

2006 for several months. In consultation with Eurostat and NSI's it was deemed desirable to include an additional round of feedback from NSI's before the release of the public version of the database. As a result a draft version of the public database will be completed on 31 October, which – together with the documentation, such as the draft EU KLEMS Manual – will be made available to NSI's between 1 December 2006 and 20 January 2007. An meeting of the internal data-co-ordination group of the EU KLEMS consortium is scheduled for January 2007 to discuss final issues, before the database will be publicly released in Brussels on 15 March 2007.

The release of the EU KLEMS database in March 2007 will go together with a joint publication, called the *EU KLEMS Productivity Report*. This short report will describe the major trends in labour productivity, multifactor productivity and relative price and output structures. It will be an instrument for the wider dissemination of the information on major trends to, e.g., European and national policy makers, business and the media.

As part of the development of the EU KLEMS project, a user manual is foreseen which will also be released in March 2007. The purpose of that manual is to provide a documentation of sources and methods of the database. The aim is to develop the user manual into the first volume of a 3-volume EU KLEMS series on *Productivity in Europe: Measurement, Trends and Explanations* (see below).

Following the release of the public database on 15 March 2007, significant effort is required to develop a statistical implementation plan for EU KLEMS. NSI's have indicated this plan is needed in order to be able to assess the possibility to continue the database upon completion of the project. Various models are feasible, ranging from a continuation of the database by the EU KLEMS research consortium (or part of it), continuation by Eurostat or continuation by individual NSI's. Consultation with Eurostat and NSI's on statistical implementation is planned for the final phase of the project.

Finally, the consortium has proposed the Commission to extend the end date of the project from 31 August 2007 to 31 December 2007. This creates a somewhat larger timespan between publication of the first and second version of the EU KLEMS database. The release of the second version in December 2007 is attractive for other reasons as well. Most importantly, as most data at industry-level from national accounts are being publishing around the summer, an earlier release in, say, August, will not make it possible to process the data for the pre-last year in time. By using the autumn period, a release in December will also make it possible to include an estimate for 2006.

A final conference on the EU KLEMS project is foreseen for December 2007 in Amsterdam. At this conference, in addition to the release of the second version of the EU KLEMS database, a range of research papers from the EU KLEMS consortium and contributions from outside the consortium are planned.

A revised time line for the final 16 months of the EU KLEMS project is provided below.

Upon finalization of the project, the consortium plans a three-volume release of a series, called *Productivity in Europe: Measurement, Trends and Explanations*. Volume I, provisionally titled *The Measurement of Productivity in Europe* will be a rework of the EU KLEMS user manual, discussed above. Volume II, which is provisionally titled *Trends and Comparisons of Productivity in Europe*, will develop descriptive comparative growth accounting papers for groups of countries in Europe and beyond. Following the work on the analytical research, a selection of research papers may be published in a third edited volume, which is provisionally titled *Explaining Productivity in Europe: The Role of Labour, Technology and Firms*.

	Sep-06	Oct-06	Nov-06	Dec-06
Database activities	workshop NSI's CEE countries Vienna	work on draft public version of EU KLEMS database	1 November: Completion of draft public version of database	1 December: Completion of draft EU KLEMS manual
Analytical research	work on research projects	work on research projects	work on research projects	12 December: WP9 workshop Helsinki
Communication	10-11 September: workshop NSI's CEE countries Vienna	1 October: close of feedback round on preliminary version of EU KLEMS	feedback on database from NSI's, Eurostat, Commission, etc.	feedback on database from NSI's, Eurostat, Commission, etc.

	Jan-07	Feb-07	Mar-07	Apr-07 to Nov-07	Dec-07
Database activities	11 January: Data Coordination Group meeting Amsterdam	15 February: Completion of 1st version of EU KLEMS database	15 March: Launch of 1st version of EU KLEMS database	development of 2nd version of EU KLEMS database	completion of 1st version of EU KLEMS database
Analytical research	work on research projects	work on research projects	16-17 March: consortium meeting on research	workshops on EU KLEMS research projects	final external conference on EU KLEMS project
Communication	20 January: close of feedback round on draft version of database	development of statistical implementation plan	publication of 1st EU KLEMS Productivity Report	development of statistical implementation plan with NSI's	completion of 2nd EU KLEMS Productivity Report